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In the U. S. approximately 795,000 people experience a new or recurrent stroke yearly. Stroke survival has increased with advances in medical technology. The impact of stroke on a patient's neurological status poses critical challenges for nurses. Communication is one area impacted by stroke. Strokes affecting the brain's right hemisphere (RHS) have been described in the literature as negatively impacting communication behaviors of patients, often in a subtle manner. The purpose of this exploratory descriptive study was to examine the knowledge that RNs in North Carolina possess about communication impairments associated with RHS and how these nurses anticipate using knowledge gained about these impairments in the care of these patients. The study also explored perceived barriers and facilitators to participating in continuing education about RHS associated communication impairments.

The RHS Communication Impairment Knowledge Assessment tool assessed demographic variables, knowledge of RHS associated communication impairments, perceived barriers and facilitators to participating in continuing education about communication clusters associated with RHS, as well as how nurses anticipate using education about these impairments in caring for patients following RHS. The study setting was North Carolina. A purposive sample of North Carolina RNs was contacted through email; and a sample size of 2495 was recruited. The study was guided conceptually by Ajzen's theory of planned behavior.

Results indicated that a large percentage (78.2%) had received education about RHS associated communication impairments in their undergraduate nursing programs. The mean score on the 12-item knowledge assessment was 6.15 with less than 50% answering 3 specific application of knowledge questions correctly. The KR-20 for these 12 items was 0.532 which is an acceptable KR-20 for short tests (10 – 15 items). Cost of continuing education courses (23.5%), work responsibilities (32.9%), and family responsibilities (23.7%) were infrequently reported as barriers to participating in continuing education about these communication impairments while identified education need (87.1%), interest in learning (72.2%), providing better patient care (89.3%), improved decision making (87%), and increased competency (71.4%) were all frequently reported as facilitators to participating in RHS communication cluster continuing education. Three themes emerged regarding how RNs would use knowledge gained to change their patient care. These themes were: awareness of the need for education, improved nursing management of patients, including patient teaching and critical thinking, and better communication with survivors of RHS. The research contributed to the current body of nursing science by identifying knowledge gaps of NC RNs on RHS associated communication impairments, barriers and facilitators to participation in RHS continuing education, and intended changes in care based on continuing education.

AN EXPLORATION OF NURSES' KNOWLEDGE OF RIGHT HEMISPHERE STROKE ASSOCIATED COMMUNICATION IMPAIRMENTS

by

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Approved by

_____
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This work is dedicated to my husband Chip, our children, Kinsey, Leigh, and Daniel, our grandson, Paul, and to survivors of stroke everywhere.

APPROVAL PAGE

This dissertation written by SUSAN KISER BROOKS has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro.

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

In the United States (U. S.) stroke is the third leading cause of death and the leading cause of disability with approximately 615,000 surviving a stroke yearly (Go et al., 2014; Mauk, Lemley, Pierce, & Schmidt, 2011; Mozaffarian et al., 2015). The decrease in stroke-related deaths over the most recent years contributes to stroke as the leading cause of disability in the U. S. (Mauk et al., 2011). Stroke survival may affect varying aspects of one's neurological status, ranging from motor deficits, sensory deficits, cognitive deficits, and communication impairments (McGilton et al., 2011; O'Halloran, Worrall, & Hickson, 2009; Sorin-Peters, McGilton, & Rochon, 2010). The large number of stroke survivors annually increases the need to recognize the effects of stroke on the individual's life and to minimize any deficits. Left hemisphere stroke occurs slightly more frequently (54%) than right hemisphere stroke (46%); typically there is a greater focus on diagnosis and treatment of the language impairments associated with left hemisphere stroke (Hedna et al., 2013; Mackenzie & Brady, 2008a).

There is very little research describing the nurse's care for communication impairments associated with strokes affecting the brain's right hemisphere (RHS) supporting a need for research assessing nurses' knowledge and attitudes, as well as intention to assess and implement care for these patients. This information is important

in developing effective education programs to provide this information to RNs and develop successful patient care strategies for this population.

Significance of the Problem

Communication impairments are frequently associated with neurological damage. Communication impairments may occur from damage in a number of locations in the brain but is most frequently associated with the left. The right hemisphere of the brain influences one's perception and understanding of communication within one's environment. In addition to left side weakness or paralysis, survivors of right hemisphere stroke with left hemiparesis (RHS) often experience cognitive and perceptual neurological deficits which affect vision, audition, and sensation. These cognitive and perceptual deficits may result in difficulty with high level language skills, discourse, prosody, unilateral neglect, and anosognosia (G. Myers, 1991). Nurses need knowledge of how these impairments manifest to best care for patients following a RHS. Well-developed assessment tools are needed to evaluate these subtle language deficits. Accurate assessment of the presence of deficits may both quantify and qualify the nature of weakened and spared abilities and compensatory mechanisms. This may also inform both treatment processes and stimuli (Miller et al., 2010). These subtle perceptual impairments can play a key role in communication success between the survivor of a RHS survivor and the nurse who cares for the survivor. This section will briefly describe the potential area of impairment and how it affects communication.

Healthcare workers need accurate knowledge of the specific communication impairment in order to effectively assess, treat, and communicate with the individual with

a communication disorder (O'Halloran, Worrall, & Hickson, 2011). There is limited research in the speech language pathology domain and a scarcity of nursing literature regarding the effects of RHS. Nursing literature describing the effects of RHS on communication and how nurses may best communicate with these patients is strongly needed. Nurses historically serve as a patient's first contact within the healthcare system, triaging patients in a physician's office and in the emergency department. In an inpatient unit, nurses are available 24 hours each day, and as such need an understanding of the types of high-level communication impairments exhibited with RHS and how to effectively communicate with these patients.

Unfortunately, these high-level impairments are often unnoticed until these patients are discharged home. Nurses are responsible for patient education and patient advocacy, so that patients or their caregivers can best provide care for the stroke survivor (Miller et al., 2010). Patients need teaching regarding medications, rehabilitation exercises, and prevention of additional stroke or illness. Survivors of RHS with anosognosia may demonstrate resistance related to education needs. The subtle presentation of communication impairments associated with RHS may interfere with the nurse recognizing the patient's educational needs and determining adequate understanding of teaching given. Nurses need a better understanding of these deficits to be able to tailor the education provided, so they meet the learning needs of these patients.

Effective communication is an important step in establishing the nurse-patient relationship, and as such it is necessary that nurses possess knowledge related to impairments with RHS so they are not perceived as an environmental barrier in

communication (Clarke, 2014; O'Halloran et al., 2011). There is a need to enhance nursing knowledge and collaboration between speech language pathologists and nurses to best provide care for patients with RHS associated communication deficits (Cocks, Hird, & Kirsner, 2007; Miller et al., 2010; Saldert & Ahlsén, 2007). Aphasia has been the primary focus of communication post brain injury with very little focus on communication deficits following RHS (Abusamra, Cote, Joanette, & Ferreres, 2009). The subtle presentation of communication impairments following RHS may contribute to difficulties and delays in the detection of these deficits in acute care and inpatient rehabilitation settings. Nursing knowledge of communication deficits following RHS can impact a patient's recovery and ability to cope with these deficits. Early assessment and intervention may positively impact quality of life post stroke for these patients (Blake, Frymark, & Venedictov, 2013).

Problem Statement

Nurses who care for patients who have sustained a RHS often do not have sufficient education about the condition in order to provide the best care for their patients. In addition, nurses experience barriers and facilitators to properly caring for RHS survivors with communication impairments. Attitudes, subjective norms and perceived behavioral control may contribute to these barriers and facilitators.

Purpose

The purpose of this study was to assess the knowledge levels that registered nurses in North Carolina have about right hemisphere stroke and communication impairments. The study further examined barriers and facilitators to the nursing care of

RHS survivors, and how nurses would change their care of RHS patients based on their increased knowledge of the condition.

Rationale for Proposed Study

This study was warranted for a number of specific reasons. The paucity of research regarding nursing care of patients with RHS associated communication impairments establishes the need for increased nursing knowledge of these impairments. Determining nurses' knowledge, attitudes and intention to learn about the nursing assessment and care management of RHS associated communication impairments will facilitate care for this patient population. Survivors of stroke need to be able to communicate with healthcare providers to better understand post-stroke care and to improve the likelihood of compliance with medication and rehabilitation regimens. Determining nurses' knowledge, attitudes and intentions toward learning about these communication impairments serves as the initial step in determining barriers and facilitators of registered nurses' accurate assessment and care for RHS survivors. Icek Ajzen's theory of planned behavior can serve as a guide for exploring these barriers and facilitators (Ajzen, 1991, 2005).

Information learned from this study will support the benefits of for continuing education for RNs who care for survivors of RHS experiencing communication difficulties. Knowledge of the barriers and facilitators to learning about RHS associated communication impairments can be used to design education programs aimed at increasing this knowledge. This may facilitate these patients' communication with

healthcare providers, family, and friends. Communication is an important component of interpersonal relationships.

Theoretical Framework

The methodology for this study was based on Icek Ajzen' theory of planned behavior, which explains human behavior with regard to stable underlying conditions. According to the theory, individuals who lie are considered dishonest; those performing poorly are considered lacking in either ability or motivation, while those who help people in need are believed to be compassionate (Ajzen, 2005). Honesty, motivation and compassion are all believed to be personality traits.

Adequacy of Theory of Planned Behavior

Prior to discussing planned behavior, one must first define behavior and the factors that determine an individual's behavior. How do humans decide what it is that they will do? First the desired or target behavior must be identified and defined. Second, barriers and facilitators to performing the behavior must be introduced and considered. Finally, the individual must value implementing, or intending to perform, the desired behavior. The intention to perform a desired behavior immediately precedes performing the desired behavior and can serve as a substitute measure of the actual behavior (Lapkin, Levett-Jones, & Gilligan, 2015). For the purpose of this study, the desired behavior is the intent of registered nurses (RN's) in North Carolina to be cognizant of the behaviors associated with RHS and then to take these into account when working with individuals with RHS.

Usefulness of Theory

Icek Ajzen's theory of planned behavior has been used in research of educational interventions aimed at adult learners. Derived from Fishbein and Ajzen's theory of reasoned action (1975), the theory of planned behavior clarifies the variables that directly influence behavior and changing one's behavior. In the theory of planned behavior, three factors influence or predict an individual's intent to perform the desired behavior. The first of these factors is determining the individual's attitude toward the behavior. The second factor involves subjective norms, the individual's beliefs regarding motivation to comply with others' expectations. The last factor, perceived behavioral control, includes the individual's beliefs regarding the perceived level of control over factors that may facilitate or hinder their performance of the behavior (Knowles et al., 2015). The theory of planned behavior has been used to assess health professionals' beliefs about a desired behavior and any perceived barriers or facilitators to performing this desired behavior (Holdsworth et al., 2015). The intention to perform a behavior depends on these three concepts. Attitudes, subjective norms, and perceived behavioral control are direct influences on intention to perform a desired behavior (Côté, Gagnon, Houme, Abdeljelil, & Gagnon, 2012; Lapkin et al., 2015). Each of these direct concepts will be described below.

The theory of planned behavior has been previously used in studies examining the influences of nurse behavior intention. Knowles et al. (2015) examined the influence of nurses' attitudes, beliefs, and intentions on choice of bowel management programs in intensive care nurses while Nelson, Cook, and Ingram (2013) evaluated these same

concepts as predictors of the accuracy in blood pressure monitoring. Cote et al. (2012) applied the theory of planned behavior to determine the factors that influence nurses' intention to integrate research evidence into clinical decision-making.

Intention. In the theory of planned behavior, intention to complete an action or a desired behavior, immediately precedes performing the desired behavior (Lapkin et al., 2015). Intention to perform a behavior does not always directly correspond to an individual performing the behavior. The appropriate measure of behavioral intentions accounts for an appreciable proportion of the variance of the actual behavior (Ajzen, 2005).

Behavior. Behavior is an action. Merriam-Webster define behavior as "the manner of conducting oneself" ("Behavior | Definition of Behavior by Merriam-Webster," n.d.). Behavior is described as a product of one's intent to act within the constraints of the perceived behavioral controls (Ajzen, 2005). The theory of planned behavior proposes that performance of any human behavior is a combined product of an individual's intentions to and perceived control toward performing the behavior. Several conditions must be met in order for an individual to commit to performing the behavior in question. Both the measure of intention and the perceived behavioral control must be compatible with the desired behavior, and each must be assessed from the same perspective.

The theory of planned behavior implies that there is a predictive quality for individuals performing desired behaviors. Factors that influence or predict the likelihood of performing a desired behavior include both the individual's intentions and their

perception of their control in performing the behavior. Predicting behavior may differ in various situations and with various behaviors. One cannot always predict behaviors (Ajzen, 1991). Understanding human behavior presents challenges because humans are unique individuals with their own behavioral beliefs and attitudes.

Concepts. As stated previously, the key concepts associated with predicting an individual's intention to perform a desired behavior include attitudes toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 1991, 2005; Knowles et al., 2015). This section will apply these constructs to the intention of registered nurses to implement care strategies to RHS survivors experiencing communication impairments.

Attitudes. The first determinant of an individual's intent to perform a behavior is attitude, and this determinant is based within the individual. Individuals demonstrate a disposition or proclivity either in favor of or against an object, person, institution, or event. This disposition to respond either favorably or unfavorably is one's attitude. Typically attitudes reflect either a positive or negative evaluation of the object in question. Attitude classification is based on cognitive, affective, and connotative influences (Ajzen, 2005).

Cognitive influences typically include one's perceptions and thoughts about the attitude object (Ajzen, 2005). For the purpose of this study, the attitude object is nurses' attitude toward learning about of RHS communication impairments. Assessing cognition of these impairments is an essential component of determining nurses' knowledge, perceptions and thoughts influencing their care for these patients. Surveying nurses' cognition regarding these patients would include questions of their thoughts and

perceptions about survivors of RHS and communication. Without adequate knowledge of these impairments, nurse cannot implement best practices into the care of RHS survivors.

Attitudinal affective influences involve feelings towards the attitude object (Ajzen, 2005). In the affective domain, attitudes may reflect a wide range of feelings. With respect to RHS survivors, nurses may report positive attitude responses such as admiring their hard work, while a nurse who believes that there are no communication deficits associated with RHS may respond with a negative attitude response.

Connotation reflects an inclination to act with purpose. Connotation in attitude response includes behavioral inclinations, intentions, commitments, and actions regarding the attitude object (Ajzen, 2005). Nurses with positive attitudes toward survivors of RHS may verbalize or report their intent to spend more time with these patients, collaborating with professionals from other disciplines, or reading the literature to learn more about their care. A negative attitude might be reflected in the nurse reporting that they only enter these patients' rooms or interact with RHS survivors for scheduled care activities.

Cognition, affective and connotation all impact an individual's attitude toward performing the targeted behavior with attitude typically serving as the strongest predictor of behavioral intention (Lapkin et al., 2015). Surveying attitudes of N. C. registered nurses would need to assess all three domains of attitude to best describe the barriers and facilitators of nursing care for RHS survivors experiencing communication impairments.

Subjective norms. Typically human beings behave in a sensible manner. This is a basic assumption of the theory of planned behavior. The second determinant of behavior reflects societal influence on the individual in question. Societal influences (subjective

norms) exert either a positive or negative motivating influence on the individual performing the desired behavior. Generally when someone experiences social pressure to perform a behavior, they are more likely to perform it (Ajzen, 1991, 2005; Lapkin et al., 2015). Subjective norms have demonstrated a weaker predictive influence on the health professional students' intention to perform the desired behaviors studied (Lapkin et al., 2015).

Perceived behavioral control. The concept perceived behavioral control addresses the individual's perception of the degree to which the individual has control over their action. The perception of control plays a large role in an individual choosing to implement a desired behavior. Internal locus of control occurs when an individual believes that they maintain control of their actions and decisions. Conversely, external locus of control occurs when an individual believes that an outside force maintains control of the individual's actions and decisions (Ajzen, 2005).

Communication is a vital component of an individual's life and is a social process. Successful communication involves both social and linguistic factors (Brownell, Pincus, Blum, Rehak, & Winner, 1997). Socially, one needs to be able to recognize cues from another person to effectively communicate (Brownell et al., 1997). Without the ability to successfully or appropriately communicate people have difficulty with social relationships, daily activities, and meeting their basic needs. Socially appropriate or successful communication is more than words or the exchange of words, but involves a shared message between two parties in a reciprocal fashion. Each participant alternates sending and receiving messages. Effective communication involves the individual's

cognitive, visual, and auditory skills (Williams, 2005). Stroke, an acquired brain injury, may cause impairment to one or all of these skills (Chapey, 2008).

The right hemisphere is thought to contribute to language processing, and right hemisphere brain damage (RHS) in adults can generate a variety of deficits with both communication and thus social interaction (Cocks et al., 2007; Saldert & Ahlsén, 2007; C. Tompkins, Scharp, Meigh, & Fassbinder, 2008). These deficits may include pragmatic, prosodic, lexico-semantic, and discursive language impairments. Approximately 50% of individuals surviving RHS are expected to present with at least one or more of these deficits (Ferré, Fonseca, Ska, & Joanette, 2012a; Saldert & Ahlsén, 2007). These subtle language impairments seen with RHS can result in difficulty assimilating more complex, or large units of information and with conveying personal thought to others, resulting in difficulties with both social and professional aspects of life (Clarke, 2014; Miller et al., 2010). While abilities with phonetics and syntax may remain unaffected, survivors of RHS often experience difficulties with comprehension and language production in complex communication situations (Saldert & Ahlsén, 2007).

Icek Ajzen' Theory of planned behavior can easily be applied to nurses caring for survivors of RHS. Educational interventions aimed at nurses are typically focused on assisting the learner in the development of knowledge, competencies, and abilities that allow them to perform the job functions needed and to meet the institution's goals (Inoue, Del Fabbro, & Mitchell, 2012). This study proposes that increasing the registered nurse's knowledge of communications impairments associated with RHS will develop the nurse's

knowledge, competency, and ability to successfully care for these patients in the inpatient setting.

Theory of Planned Behavior in Research

Derived from Fishbein and Ajzen's theory of reasoned action, the theory of planned behavior proposes that performance of any human behavior is a combined product of an individual's intentions and perceived control about executing the desired action. Dependent on an individual's attitude toward the action or task, the subjective norms of the population, and the degree of perceived behavioral control, intention is the antecedent to behavior execution (Ajzen, 1991, 2005). The theory of planned behavior implies that there is a predictive quality for individuals performing a desired action. Factors that influence or predict the likelihood of performing a desired task include both the individual's intentions and their perception of their control in performing the desired action. Behavior is unpredictable, and may differ in various situations and with various behaviors. The theory of planned behavior serves as a framework for researching knowledge, attitudes, and intent to provide evidence-based nursing care to survivors of RHS.

Attitude Toward Behavior

Prior to implementing a behavior, individuals possess beliefs and expectations about the behavior's outcome. These beliefs and expectations are components of one's attitude toward the behavior, and are the determinants of intention and behaviors (Hung, Chu, Lee, & Hsiao, 2016). Attitude classification is based on cognitive, affective, and connotative influences (Ajzen, 2005).

Cognitive influences typically include one's perceptions and thoughts about the attitude object (Ajzen, 2005). For the purpose of this study, the attitude object is the nurses' knowledge of RHS communication impairments. Assessing cognition of these impairments is an essential component of determining nurses' knowledge, perceptions and thoughts influencing their care for these patients. Surveying nurses' cognition regarding these patients would include questions of their thoughts and perceptions about survivors of RHS and communication. Without adequate knowledge of these impairments, nurses cannot implement best practices into the care of RHS survivors. Hung et al. (2016) investigated the effects of 548 staff nurses' attitudes and intentions regarding reporting medication errors on actual reporting behaviors, and found that the attitudes of nurse managers and coworkers (subjective norms) served as predictors of nurses reporting medication errors.

Attitudinal affective influences involve feelings towards the attitude object (Ajzen, 2005). In the affective domain, attitudes may reflect a wide range of feelings. With respect to RHS survivors, nurses may report positive attitude responses such as admiring their hard work, while a nurse who believes that there are no communication deficits associated with RHS may respond with a negative attitude response.

Conation reflects an inclination to act with purpose. Conation in attitude response includes behavioral inclinations, intentions, commitments, and actions regarding the attitude object (Ajzen, 2005). Nurses with positive attitudes toward RHS survivors may verbalize or report their intent to spend more time with these patients, collaborating with professionals from other disciplines, or reading the literature to learn more about their

care. A negative attitude might be reflected in the nurse reporting that they only enter these patients' rooms or interact with RHS survivors for scheduled care activities.

Cognition, affective and connotation all impact an individual's attitude toward performing the targeted behavior with attitude typically serving as the strongest predictor of behavioral intention (Lapkin et al., 2015).

Subjective Norm

Subjective norms involve social pressure that an individual perceives concerning the performance a desired action. As stated previously, Hung et al. (2016) identified that subjective norms, the attitudes of nurse managers and coworkers, influenced a nurse's reporting of medication errors. In contrast, Lapkin et al. (2015) explored the utility of a theory of planned behavior based questionnaire to predict health professional students' behavioral intention regarding medication safety and collaborative practice, and evaluated the contribution of the three concepts, attitudes, subjective norms, and perceived behavioral control toward predicting students' behavioral intentions with relation to medication safety and collaborative practice. While subjective norms typically generate an influence over an individual's intention to perform a desired behavior, Lapkin et al. found that the construct, subjective norms, exerted a weaker predictor effect in this population. Additionally, Lapkin et al. (2015) determined that subjective norms do not completely reflect the relationships as proposed in the theory of planned behavior (Lapkin et al., 2015).

Perceived Behavioral Control

Perceived behavioral controls involved the perception of whether individuals possess the necessary resources and opportunities to perform the target behavior (Hung et al., 2016; Lapkin et al., 2015). Bonetti and Johnston (2008) examined the association between walking impairment, intention and perceived control in 203 stroke survivors over a six-month period. These researchers incorporated social learning theory, social cognitive theory, and theory of planned behavior into conceptualizing control. Locus of control from social learning theory, self-efficacy from Bandura's social cognitive theory, and perceived behavioral control from theory of planned behavior all contribute to an individual's perceived behavioral control. Measuring perceived control with regard to walking behavior at two weeks and six months after stroke recovery finding that the individual's perceived control predicts activity and disability in stroke survivors (Bonetti & Johnston, 2008).

Aims and Research Questions

1. Examine NC registered nurses' knowledge of RHS communication impairments.

   Q1: What do NC registered nurses know about RHS communication impairments?

2. Determine perceived barriers and facilitators related to RHS for NC registered nurses.

   Q2: What barriers to learning about RHS are reported by NC registered nurses?

   Q3: What facilitators to learning about RHS are reported by NC registered nurses?

3. Describe how NC registered nurses will change their care of patients with RHS communication impairments based on their knowledge self-assessment of the condition.

Q4: How do NC registered nurses anticipate using the self-assessment of their knowledge of RHS associated communication impairments to change the nursing care for these patients?

Definitions

Acute care nurse is a registered nurse licensed by the North Carolina Board of Nursing working with adult medical patients in either an acute care setting, home care setting, or extended care setting; patient care areas excluded include critical care, emergency care, maternity and pediatrics.

Right hemisphere stroke associated communication impairments – perceptual or cognitive deficits, and difficulties with language processing

Knowledge of right hemisphere stroke associated communication impairments - scores on the 12 researcher-developed knowledge items that address right hemisphere stroke associated communication impairments

Barriers to learning – factors interfering with one's motivation or desire to learn

Facilitators to learning – factors promoting one's desire or motivation to learn

Assumptions

The researcher assumed that registered nurses answered survey questions honestly.

Significance of the Study

Research has shown that survivors of right hemisphere stroke often demonstrate subtle communication impairments that are markedly different from aphasia associated with left hemisphere stroke (Blake et al., 2013; Lundgren, Brownell, Cayer-Meade,

Milione, & Kearns, 2011). This study has many implications for the nursing discipline. Acute care staff nurses have the most continual contact with patients in the inpatient setting and are the ones providing discharge teaching to their clients, and these nurses may benefit from recognizing factors that impact their participation in education about RHS survivors demonstrating communication impairments. Knowledge of the care needs of survivors of RHS may influence the coordination of patient care for this patient population. Determining the influence of nurses' knowledge of RHS communication impairments may impact these nurses' attitudes and intention in assessment and implementing care for RHS survivors.

Accurate assessment is fundamental to nursing, laying the foundation for individualized patient care. Nurses are taught how to implement the nursing process as part of their undergraduate nursing program. Nurses must be able to accurately assess and implement strategies for facilitating communication in survivors of RHS. This study examined these questions to help determine if there is a gap in knowledge regarding RHS associated communication impairments and if a behavioral change is warranted.

CHAPTER II

REVIEW OF THE LITERATURE

In the US approximately 795,000 people experience a new or recurrent stroke each year. Roughly 180,000 of this group die, leaving nearly 615,000 stroke survivors each year (Go et al., 2014; Mozaffarian et al., 2015). Stroke may affect varying aspects of one's neurological status, ranging from motor deficits, sensory deficits, memory deficits, and cognitive-communication impairments (De & Wynn, 2014; McGilton et al., 2011; G. Myers, 1991; O'Halloran et al., 2009; Sorin-Peters et al., 2010). Nearly one-half of all stroke survivors experience some form of cognitive-communication deficit (Hinckley, 2014). The large number of stroke survivors creates a need to recognize the personal effects of stroke and to find ways to minimize any residual deficits. Stroke carries a financial burden with the lifetime costs of an ischemic stroke exceeding $90,000 per survivor and greater than $225,000 per survivor of subarachnoid hemorrhage (Alberts et al., 2000). For 2010, estimated direct and indirect cost of stroke was $73 billion (Duraski, Denby, Danzy, & Sullivan, 2012).

Blood flow is vital to the brain because blood carries oxygen and essential nutrients, and any disturbance in blood flow is likely to result in loss of functioning brain tissue (Dirnagl, 2012; Wolf-Dieter, 2012). A stroke is a neurological event resulting from interruption of the blood flow to an area of the brain. An ischemic stroke results from arterial obstruction whereas arterial rupture results in hemorrhagic stroke. As the leading

cause of disability and a major cause of communication impairments in the United States (U.S.), stroke carries an impact on the life of both the stroke survivor and the survivor's family. Left hemisphere stroke occurs slightly more frequently (54%) than right hemisphere stroke (46%), typically there is a greater focus on diagnosis and treatment of left hemisphere stroke (Hedna et al., 2013; Mackenzie & Brady, 2008a). There exists a need to identify and manage the sequelae of right hemisphere stroke (RHS). Additionally, Mackenzie and Brady (2008) report that approximately 50% of RHS demonstrate some difficulties with communication post stroke.

This chapter will provide background for right hemisphere brain function and RHS associated communication impairments, as well as apply key concepts of Icek Ajzen's theory of planned behavior to organize and discuss the evidence cited in the literature related to registered nurses' knowledge, attitude, intention and behaviors in the care of patients with RHS associated communication disorders. The chapter will also clarify gaps in knowledge and actions needed to fill those gaps in an effort to educate nurses regarding these impairments in the future.

Background of Right Brain Hemisphere Function and Impairment

During the 19th century, neurologists established the importance of the left hemisphere in communication. Drs. Marc Dax and Paul Broca both independently reported that lesions in the left hemisphere of the brain were associated with speech disturbances (Cubelli & Montagna, 1994). Shortly after the independent publications by Dax and Broca, Dr. J. Hughlings Jackson emerged as a pioneer in examining the duality of the brain and exploring the role of the right hemisphere in communication. Jackson

developed his conclusions about brain function based on clinical observations of those with brain damage, and hypothesized that the right hemisphere played a complementary role in communication. He elaborated that those surviving damage to the right hemisphere of the brain demonstrated difficulty with communication (Beeman & Chiarello, 1998).

Jackson speculated that prior to research by Dax and Broca many believed that the brain was double in function. This double function may be represented as either, 1) the action of both halves is required for any mental operation or 2) that either half of the brain (independently) would serve alone (Jackson, 1864). Jackson was one of the first to describe the importance of the left hemisphere in language and words. Jackson recognized that "the brain was double in function but the two hemisphere are not mere duplicates in function" (1864, p. 130). He was one of the first to describe the role of the right hemisphere processes and communication, and identified the right hemisphere as being involved in the most automatic use of words in speech (Taylor, 1958).

Jackson described the study of brain function during the 1800's as requiring both clinical observation of the individual's function and physiological study of the brain's convolution through autopsy. Autopsy was the single trustworthy method to obtain this precise data with impairments documented through case study observations (1864). Following an individual's death, the manifestations were attributed to the hemisphere demonstrating damage.

During the 1900's the research into the function of the right hemisphere (RH) was derived from studies of patients following surgical intervention for epilepsy. This

intervention, cerebral commisurotomy, often described as split-brain surgery, involves surgically dividing the corpus callosum, in many cases also the anterior commissure, and was performed for individuals with intractable epilepsy. For these patients, seizures were uncontrolled medically despite extensive efforts to do so (Gazzaniga, 1995). Prior to implementing this radical surgical treatment, animal studies performed had demonstrated that dividing the cerebral hemisphere produced a great deficit in the transfer of sensory and motor information across the right and left hemispheres (Myers & Sperry, 1958). This study of patients following cerebral commisurotomy revealed the contributions of the RH of the brain toward an individual's ability to understand language more so than language production either verbally or in writing (Gainotti, Caltagirone, & Miceli, 1983; Gazzaniga & Sperry, 1967).

The RH is thought to contribute to language processing, and RHS in adults can generate a variety of deficits with both communication and social interaction (Cocks et al., 2007; Saldert & Ahlsén, 2007; C. Tompkins et al., 2008). These deficits may include pragmatic, discursive, prosodic, and lexico-semantic impaired language. Approximately 50% of individuals surviving RHS are expected to present with at least one or more of these deficits (Ferré et al., 2012a; Mackenzie & Brady, 2008a; Saldert & Ahlsén, 2007). The subtle language impairments seen with RHS can result in difficulty assimilating more complex units of information and with conveying personal thought to others, resulting in difficulties with both social and professional life activities (Clarke, 2014; Miller et al., 2010). While abilities with phonetics and syntax may remain unaffected, survivors of RHS often have trouble with comprehension and language production in

complex communication situations (Saldert & Ahlsén, 2007). It is important to develop an understanding of the impact of the RH in both cognition and language comprehension. Defining key terms associated with proper RH function will facilitate this understanding.

Communication Impairments

The researcher conducted a comprehensive search of the literature in preparation for this research study. This comprehensive review was conducted using the following databases: CINAHL, PUBMED, SCOPUS, and the linguistics database. The following combinations of search terms were used in this search: *communication** AND *right hemisphere stroke**, *discourse** AND "*right hemisphere stroke**," *right hemisphere stroke** AND *pragmatics**, and *visual neglect** AND "*right hemisphere stroke**". This search returned 88 articles published between 2011 and May 2016; however, the majority of these articles focused primarily on either the physical effects of stroke or aphasia, with only a fraction of these focused on RHS communication impairments. Discussion of communication deficits associated with RHS occurs almost exclusively in the speech language pathology literature and there exists a paucity of information in the nursing literature. Adding *nursing* to the above search terms yielded no articles returned. This scarcity of nursing literature served as the needs assessment for this study.

Scientists describe RHS survivors as typically linguistically sound with improper or odd speech. Fifty to ninety percent of those with right hemisphere damage experience impaired communication. The RH hemisphere plays a role in inference, and processing of information and RHS survivors often present with inferential deficits (Lehman & Tompkins, 2000; C. Tompkins et al., 2008). Generating inferences occurs in both early

and late states of cognitive processing. An inference is defined as "the act of passing from one proposition, statement, or judgment considered as true to another whose truth is believed to follow from that of the former" ("Inference | Definition of Inference by Merriam-Webster," n.d.). This passing from one idea to another facilitates the ability understand intended meaning so that an individual can infer suppositions about sensory data with the information received both seen and interpreted. Survivors of RHS need to infer sensory data as a component of communication. Inferences play a role in discourse, as well as pragmatic, prosodic, and lexico-semantic impaired language. Possibly all RHS communication impairments result from faulty inference (Blake, 2007; G. Myers, 1991). Myers (1991) purposes that inference failure following RHS may be a central deficit similar to aphasia following LHS. This section will describe RHS communication impairments and discuss pertinent assessments of each with evidence-based treatment approaches.

Discourse

Discourse is any unit of connected speech or writing longer than a sentence, and includes the ability to make inferences in communication. Discourse significantly influences an individual's ability to both convey and understand communication effectively (Blake et al., 2013; Hickok et al., 1999; Saldert & Ahlsén, 2007). Components of discourse include: receiving a trigger to stimulate discourse, determining the reference framework of this trigger, electing topic of information through linguistically forming a response, and articulating this response (Sherratt, 2007a).

Discourse in survivors of RHS was frequently described as over personalized, disorganized, and tangential, with responses that are impulsive and poorly conceived (Blake, 2007; Blake et al., 2013; Brady, Armstrong, & Mackenzie, 2005). There is supportive evidence that RHS study participants may demonstrate difficulty with discourse comprehension and discourse production. Individuals with RHS have demonstrated difficulty with suppressing unrelated and inappropriate meanings with tasks for discourse comprehension (Brady et al., 2005; C. A. Tompkins, Baumgaertner, Lehman, & Fassbinder, 2000). The inefficiency in discourse for survivors of RHS has been connected to the individual's challenges with organizing information into a hierarchy, and can present as a very indirect or inefficient answer to a direct question (G. Myers, 1991). Problems with discourse production may be impaired if the individual with a RHS reflects difficulty differentiating and evaluating inappropriate digressions and excessive additions to discourse. Additionally, the situation prompting communication has been documented as influencing discourse for both language impaired individuals and normal controls (Brady et al., 2005).

Problems with discourse is the most common communication impairment demonstrated by survivors of RHS (Hinckley, 2014; Sherratt & Bryan, 2012). One issue with conducting research regarding discourse is that there is little supportive evidence regarding what constitutes normal discourse, and defining normal discourse may require additional research with RHS individuals and matched normal controls (Brady et al., 2005; Cocks et al., 2007).

Prosody

The right hemisphere of the brain has preferential involvement in processing emotions (Knox & Douglas, 2009; Sherratt, 2007b). Humans regularly interpret and perceive social information during personal interactions, and accurate interpretation impacts the communication experience (Keuken et al., 2011). The right hemisphere plays a major role in the identification of emotional stimuli and in the interpretation of the lexical cues of facial expressions. Interpreting these cues is a major foundation to interpreting emotions (Borod et al., 1998; Bryan, 1988). Campbell (1982) presents a literature review regarding the laterality of emotions, describing the role of the right hemisphere in emotional analysis, particularly when the emotional tone displayed is negative; however, this review provided no conclusive decision regarding the laterality of emotions.

Affective prosody, a nonlinguistic characteristic of language expressing emotions and attitudes during conversation, was initially described as a dominant, lateralized function of the right hemisphere (Ross & Mesulam, 1979). Interpreting the emotion conveyed in the spoken message is important to correctly understanding communication (Ross & Mesulam, 1979; Ross & Monnot, 2011). Ross and Mesulam (1979) described through case studies of two patients following RHS, both of whom demonstrated prosody impairments in which they were unable to vary tone of voice to convey emotional changes during conversation. In a follow-up article, Ross (1981) presented case studies involving ten survivors of RHS. Of these ten patients, three demonstrated motor aprosodia, with inadequate intonation of speech, little or no physical gestures supporting

speech, and/or poor prosodic repetition; however, these three patients demonstrated the ability to comprehend prosody.

The RH of the brain has preferential involvement in processing emotions (Knox & Douglas, 2009; Sherratt, 2007b). Humans regularly interpret and perceive social information during personal interactions, and accurate interpretation impacts the communication experience (Keuken et al., 2011). Interpreting emotions is dependent on the ability to infer lexical cues with facial expressions, including evidence of RH dominance in identifying emotional stimuli (Borod et al., 1998; Bryan, 1988). Campbell (1982) presents a literature review regarding the laterality of emotions, describing the role of the RH in emotional analysis, particularly when the emotional tone displayed is negative; however, this review provided no conclusive discussion of the laterality of emotions.

Prosody helps in both the delivery and interpretation of intended meaning in communication (G. Myers, 1991). Nursing assessment of the emotional comprehension in RHS survivors presents challenges. One technique is to ask the stroke survivor to identify the emotion conveyed in a prerecorded neutral content sentence (P. S. Myers & Blake, 2008). Speech language pathologists (SLP) typically assess and manage these deficits and often validation of emotional interpretation involves corroborating the interpretation with other coworkers. These patients could benefit from interprofessional collaboration between SLP's and registered nurses. Following a RHS, the stroke survivor may exhibit a flat affect than can be interpreted by others as indifference. This flattened affect is also seen as a sign of depression (P. S. Myers & Blake, 2008).

Unilateral Neglect

Unilateral spatial neglect, the inability to sense or perceive stimuli presented in the space contralateral to a lesion in the cerebral hemisphere, frequently occurs following right hemisphere stroke. These visual and perceptual deficits often result in the RHS survivor's inability to obtain information from their environment and are commonly called attention deficits (Al-Mahasneh, 1991; Myers & Sperry, 1958; Vromen, Verbunt, Rasquin, & Wade, 2011). Murakami et al. (2014) examined the association between the locations of the brain lesion in 115 stroke survivors with attention deficit, and determined that the RHS was associated with visual cancellation task performance while damage to the left hemisphere resulted in impairment of all other attention tasks. This study confirmed that RHS is associated with the loss of processing visual-spatial information, and supported that lesion laterality may influence the type of attention deficit experienced post stroke.

Anosognosia

Anosognosia, a pathological denial of physical impairments commonly exhibited with RHS, often creates delays in treatment of syndromes regularly seen with acquired RHS and left hemiplegia (Cutting, 1978; Gardner, Brownell, Wapner, & Michelow, 1983; Leon et al., 2005). This denial is often attributed to RHS because aphasia associated with LHD can mask the stroke survivor's ability to communicate denial of their impairments. As a manifestation of RHS, anosognosia often presents with denial of hemiplegia while the stroke survivor accurately describes stroke as part of their medical history (Cutting, 1978). Gardner et al. (1983) present an example of anosognosia in describes the life of

Justice William Douglas following a RHS in 1974. Initially, optimistic news reports emphasized Justice Douglas maintained his ability to speak speculating his stroke did not affect his brain. He did demonstrate some left side hemiparesis. During the months following his stroke, Justice Douglas demonstrated serious impairments, including gross changes in behavior. Following his resignation from the bench, Douglas continued to come into his office, and outwardly denied a neurological cause for his paralysis. Gardner et al. (1983) describe an example of the impact of anosognosia in RHS. This pathological denial may impact the RHS survivor's compliance with rehabilitation activities, impacting overall health following the stroke.

Initially in working with the survivor of RHS, the nurse will want to inform the patient and the family that all stroke survivors are evaluated for communication impairments. This, along with acknowledging that the patient may not have any impairments and informing them that communication includes more than language and speech may establish rapport and promote a sense of trust (P. S. Myers & Blake, 2008).

Implications for Care

Post stroke care involves an interprofessional collaborative approach, and an interprofessional approach would best facilitate the care of RHS survivors. Disciplines focused on the care of stroke survivors include physical therapy, occupational therapy, speech language pathology, medicine, social work, nursing and family members (Marsden et al., 2010). Providing care 24 hours daily, nurses are a key foundation in this interprofessional care (Catangui & Slark, 2012). This section will describe the roles of various members of the interprofessional team in providing care to the stroke survivor.

The interprofessional healthcare team needs accurate knowledge of the specific communication impairment to effectively assess, treat, and communicate with individuals with communication disorders (O'Halloran et al., 2011). Cognitive-communication impairments are demonstrated following RHS and clinicians need tools to assess these impairments in the acute-care setting (Hinckley, 2014). The subtlety of communication impairments associated with RHS dictates the need for strong clinical assessments and may often depend on evaluation of family member or close friends (Mackenzie & Brady, 2008a; Sherratt & Bryan, 2012).

There is limited research in the speech language pathology domain and a paucity of nursing literature regarding the effects of RHS. Nursing literature describing the effects of RHS on communication and how nurses may best communicate with these patients is strongly needed. Nurses historically serve as a patient's first contact within the healthcare system, triaging patients in a physician's office and in the emergency department. In an inpatient unit, nurses are responsible for the care of patients 24 hours each day, and, therefore, need an understanding of the types of high-level communication impairments exhibited with RHS and how to communicate effectively with these patients.

Unfortunately, these high-level impairments are often unnoticed until these patients are discharged home. Nurses are responsible for patient education and advocacy so that patients or their caregivers can best provide care for the stroke survivor (Miller et al., 2010). Patients need teaching regarding medications, rehabilitation exercises, and prevention of additional stroke or illness. Survivors of RHS with anosognosia may demonstrate resistance related to education needs. The subtle presentation of

communication impairments associated with RHS may interfere with the nurse recognizing the patient's educational needs and determining adequate understanding of teaching given. Nurses need a better understanding of these deficits to be able to appropriately tailor the education provided so they meet the learning needs of these patients.

Effective communication is an important step in establishing the nurse-patient relationship, and as such it is necessary that nurses possess knowledge related to impairments with RHS so they are not perceived as an environmental barrier in communication (Clarke, 2014; O'Halloran et al., 2011). There is a need to enhance nursing knowledge and collaboration between speech language pathologists and nurses to best provide care for patients with RHS associated communication deficits (Cocks et al., 2007; Miller et al., 2010; Saldert & Ahlsén, 2007). Aphasia has been the primary focus of communication post brain injury with very little focus on communication deficits following RHS (Abusamra et al., 2009). The subtle presentation of communication impairments following RHS may contribute to difficulties and delays in the detection of these deficits in acute care and inpatient rehabilitation settings. Nursing knowledge of communication deficits following RHS can influence a patient's recovery and ability to cope with these deficits. Thus, early nursing assessment with prompt implementation of intervention strategies may positively impact recovery and quality of life post stroke for these patients (Blake et al., 2013).

Nurse's knowledge is a key factor necessary for early assessment and intervention. Given the literature gaps, there is a need to advance nursing science in the

area of RHS communication deficits. It is essential to determine nurses' knowledge of RHS associated communication impairments to determine future educational needs, and surveying nurses' will assist in completing this assessment. With the current standard for evaluating understanding of patient education being "Teach Back" of information provided, would the increased verbosity and tangentiality demonstrated by RHS survivors affect evaluation of teaching with "Teach Back?" Would RHS survivors likely be viewed as not understanding the material or needing additional education because of the inclusion of unnecessary details?

Given the lack of research returned for nursing and RHS, research in this area can greatly enhance nursing science. These areas include: assessing the relationship between communication impairments associated with RHS and quality of life; assessing how communication impairments associated with RHS affect the relationship between the stroke survivor and primary caregivers; and determining if an education intervention enhances the nurse's knowledge of RHS associated communication impairments. Determining nurses' knowledge of RHS communication disorders is needed, which can then lead to focused education efforts to enhance nursing knowledge in this area, and subsequently improved quality of care.

Communication deficits such as problems with speech pragmatics, discourse, understanding semantics, interpreting and displaying emotions, interpreting abstract images and metaphors, and visual neglect are commonly seen in patients with RHS. Speech language pathology was the primary discipline responsible for the research regarding these deficits. Nurses also work with these patients and with the paucity of

nursing literature and research regarding these patients supports the need for additional education and research in this area.

Communication impairments frequently result from neurological damage. Knowledge of the role of the RH in communication has evolved since the mid-1800's. Medical research following commisurotomy laid a strong foundation to understanding the role of the RH in communication. The diverse profiles seen in RHS survivors creates unique challenges in the care of these patients. Discourse, visual neglect, and the ability to interpret emotions are potentially affected by RHS. A strong knowledge base of these impairments may support providing individualized nursing care to meet the needs of these patients. There is a need for additional research in both nursing and speech-language pathology disciplines for evidence-based treatment interventions for these deficits.

Knowledge of Care Management

Stroke is a large public health problem. Knowledge of clinical manifestations and appropriate nursing management is essential to providing individualized patient care. There is an evidenced need for nursing education on post stroke care including communication impairments associated with RHS. In a cross-sectional study with 20 nurses, Sbampato dos Santos et al. (2017) used a pretest and a post-test to assess nurses' knowledge of stroke and the use of the National Institute for Health Stroke Scale (NIHSS). This study revealed that correct answers on the knowledge assessment improved from 68.5% on the pretest to 85.26% on the post test. Reynolds, Murray, McLennon, and Bakas (2016) used a similar design with pretest and post test to

determine if a stroke competency program would improve nurses' knowledge of and adherence to evidence-based practices in the care of patients with stroke. This study yielded also a positive increase in knowledge scores following the implementation of the stroke competency program, and educating the participating nurses about this evidence-based competency.

Nurses may use specialized education in implementing individualized patient care for patients experiencing communication impairments associated with RHS. Continuing nursing education is essential to provide nurses with growth opportunities that heighten their competence and improve their ability to provide quality nursing care (American Nurses Credentialing Center, 2011). Ideally, continuing learning offerings need to address the nurses' needs filling any identified gaps in their practice.

In nursing there are typically three types of identified gaps: knowledge, skill, and practice (DeSilets, Dickerson, & Lavin, 2013; Lubejko, 2015). The type of gap guides the design of the continuing education offering to include developing the desired outcomes, learning techniques and the evaluation (Lubejko, 2015). With the identified knowledge gap regarding communication impairments in survivors of RH stroke, a variety of methods may be effective such as lecture-discussion, case studies, games and interactive approaches. Continuing education offers both new information and useful tools that may assist the nurse to reframe both thinking and behavior to improve patient care (Tarnow, Gambino, & Ford, 2013).

Continuing education is a valuable tool to assist nurses with maintaining knowledge of patient care issues, a motivated workforce, and in the provision of safe,

patient care (Pool, Poell, Berings, & ten Cate, 2016). Nurses have reported that continuing education is important for maintaining professional competence, improving standards, and continued current knowledge of care. In a qualitative study with 23 clinical nurse participants, Govranos and Newton (2014) explored nurses' perceptions of clinical continuing education. In a survey of 672 nurses, Nalle, Wyatt, and Myers (2010) determined that nurses reported a variety of reasons for participating in continuing education. Identified learning needs included: leadership and management, evidence-based practice, as well as advance practice issues. As is true with andragogical education principles, adults are more likely to participate in learning when there is a perceived reason to participate (Govranos & Newton, 2014).

Continuing professional education can be offered in a variety of methods including face-to-face classes, case studies, and online learning modules. Online education activities facilitate independence with learning with students taking the lead in their learning. Successful web-based learners are typically independent learners who demonstrate responsibility for enhancing their learning through networking with other students, independently requesting assistance, or seeking feedback (Bromley, 2010).

While nurses have identified the value of continuing education, there are also barriers to engaging in continuing education activities. Nalle, Wyatt, and Myers identified cost of attending continuing education programs, difficulty in taking time off from work, childcare, and home responsibilities as the most frequently reported deterrents for RN participation in continuing education. Of the 672 nurses participating in this study, 59% of the participating nurses rated continuing education as very important

and 29% rated continuing education as important. Interestingly, the educational level of the participating nurses correlated positively with participation in continuing education as nearly 90% of those with advanced degrees (master's degree in nursing or terminal degree) accruing greater than 15 hours of continuing education in the 2 years prior to study involvement. Factors that influence continuing education participation included personal and professional interest (43%), job or licensure requirement (20%), and career advancement (12%). Nurses participating in Nalle, Wyatt and Myers' study reported that they valued continuing education, they also reported several barriers to participation. These barriers included program costs, time away from work, travel requirements, and inadequate funding (Nalle, Wyatt, & Myers, 2010). Nurses participating reported that personal, professional, and organizational factors influenced participation. Continuing education is essential for maintaining clinical competence and ideally should be integrated into the workplace environment (Govranos & Newton, 2014). Nurses may use the specialized knowledge of RH communication impairments to implement individualized patient care for patients experiencing communication impairments associated with RHS.

Pool, Poell, Berings, and ten Cate (2016) conducted a qualitative study with 21 RNs to examine the relationship between participation motives and continuing education activities. The most commonly reported reasons for participating in continuing professional education in this study include increased competence, to deepen knowledge, comply with requirements, and to enhance career development.

Conclusion

The SLP literature describes the assessment and treatment strategies for survivors of RHS. The nursing literature discusses best practices for communication impairments associated with LHS. The paucity of nursing literature describing the best practices for assessment and intervention in the care of communication impairments associated with RHS supports the need for additional research in this arena. There is a need to determine what nurses are doing in their practice to care for these patients and the impact of additional knowledge on the intention to provide care to improve RHS communication impairments. The theory of planned behavior can guide a study focused on determining nurses' perceived barriers and facilitators for participating in education offerings addressing RHS associated communication impairments. This information will help guide future educational offerings addressing the nursing care for these patients. Nurses' knowledge is critical to develop and implement care.

CHAPTER III

METHODS

The purpose of this study was to identify the degree of knowledge that NC registered nurses have about RHS and associated communication impairments. The study further examined barriers and facilitators to nurses' learning about communication impairments associated with RHS and how nurses would anticipate changing their care of RHS patients if they had updated knowledge of the condition. This chapter describes the methodology of the research including the study design, setting, description of the sample, ethical considerations, study instruments, and procedures for data collection and data analyses. The research questions are presented along with a discussion of the statistical tests used for data analysis.

Research Design

This research study employed a descriptive, exploratory, cross-sectional design with online surveys to investigate RN knowledge of RHS associated communication impairments, RN perception of barriers and facilitators of participating in continuing education, as well as their perception of how they might incorporate knowledge of these impairments into the care of RHS survivors. As a non-experimental study, a descriptive study observes, describes and documents characteristics of a desired phenomenon and may serve as the starting point for generating a hypothesis (Polit & Beck, 2012). With

very little research literature available regarding nursing knowledge and nursing care of RHS associated communication impairments, this exploratory study will serve as a foundation for determining future research need in this area. This cross-sectional study examined knowledge of RHS communication impairments in North Carolina registered nurses (RNs) employed in home care, nursing homes and extended care facilities, as well as acute care hospital settings. The online survey allowed the researcher to reach a large number of RNs. A survey is a flexible, practical, efficient research method when participants directly provide their responses and the data can be gathered through structured questions involving short answers (Polit & Beck, 2012; Vogt, Gardner, & Haeffele, 2012). Online surveys allow for participant anonymity and as a self-administered survey may allow a researcher to present identical questions to a large number of participants (Nulty, 2008); however, one limitation of survey-based research is the response rate. Online surveys have demonstrated a response rate of 20% following e-mail invitation only (Kaplowitz, Hadlock, & Levine, 2004; Porter & Whitcomb, 2003). Response rates can be bolstered by providing completion incentives (Nulty, 2008). Measuring data during a single period of time, a cross-sectional approach is suitable to examine the knowledge level of registered nurses (RNs) regarding communication impairments associated with right hemisphere stroke for a single point of time (Polit & Beck, 2012). Participants were RNs in North Carolina working in either home care, nursing homes and extended care facilities, or acute care hospital settings.

Setting

North Carolina served as the setting for this research study. Data were collected using an online survey during a three-week period in the spring of 2017. The population of RNs in North Carolina is similar to the RN population in the U. S. Approximately 62% of nurses in the U. S. work in the acute care hospital setting (DHHS, 2010) which is a slightly higher percentage than the approximately 55% of N. C. nurses working in the acute care hospital setting (North Carolina Board of Nursing, 2016). Nationally, 6.4% of RNs work in the home health setting (DHHS, 2010) and approximately 6.5% of N. C. RNs reporting employment in home health (North Carolina Board of Nursing, 2016). Nationally, 5.3% of RNs work in the nursing homes and extended care facilities (DHHS, 2010) compared with the 5.2% of N. C. RNs reporting employment in these same areas (North Carolina Board of Nursing, 2016). Therefore, North Carolina provided a sample of RNs that was considered representative of the RN population nationally.

Sample and Recruitment

This study included a purposive sample of North Carolina RNs employed in home health care, nursing homes, extended care or assisted living facilities, and in acute care hospital settings. These patient care areas were selected for the study because stroke survivors are patients in each of these areas and the communication impairments associated with RHS are typically subtle in presentation and more likely noticed during less critical care periods (Miller et al., 2010). A purposive sample uses the researcher's knowledge about the population in the selection of sample members (Polit & Beck, 2012). As of July 22, 2016, there were 103,422 RNs licensed in North Carolina with

56,570 RNs (54.6%) employed in hospital settings, 6737 RNs (6.5%) employed in home health, and 5438 (5.2%) employed in nursing homes, extended care or assisted living facilities. These care areas were chosen because RHS survivors typically receive care in acute care hospitals, home health, nursing homes, and extended care facilities. This purposive sample of N. C. is representative of the national RN population allowing for generalizability of the study findings to the larger population (Polit & Beck, 2012). All RN names listed in this data request who met the inclusion and had active e-mail addresses were invited to participate in this study.

Inclusion Criteria

Inclusion criteria were RNs licensed in North Carolina identified as working in either hospital settings where adults are treated, home health care, or nursing homes, extended care or assisted living facilities. Participants had an e-mail address as a contact method from the NCBON and needed internet access for completing of the online survey. The data file from the NCBON identified RNs by field and practice setting. The researcher reviewed this file and selected nurses working in practice settings and fields that were more likely to care for patients following a brain injury, such as nurses practicing in neurosciences, rehabilitation, and medical-surgical nursing. The researcher also eliminated from the invitation any RNs who were listed as working in mental health, pediatrics, or maternal child nursing from the invitation to participate. The inclusion-exclusion criteria were included in the e-mail invitation to participate. The literature describing RHS survivors discussed that the subtle communication impairments are not

typically reported or identified in the emergent or critical care periods. This supports the exclusion of these RNs from the study sample.

Exclusion Criteria

Nurses working in mental health nursing, pediatric or maternal child hospital, critical care, or emergency services were excluded from the sample. The researcher elected to exclude nurses working in these areas because they are less likely to care for patients following a stroke. Nurses responding on the demographic questionnaire that they worked in critical care, mental health nursing, pediatric maternal child nursing were taken directly to the end of the knowledge survey to eliminate their responses from data collection.

Sample Size

The researcher purchased the names and addresses of these nurses from the NC Board of Nursing (NCB0N) once the inclusion criteria are provided. The proposed sample was 100% of the total number of nurses meeting the inclusion criteria identified in the data request, to provide the largest possible sample and will provide the widest variety of input for this exploratory study. The NCBoN typically fulfils these requests sending the information as an Excel file.

Recruitment and Participation Incentive

The researcher drafted an e-mail for use as the initial contact. This e-mail was sent to participants (Appendix A). The e-mail included the link to the online survey and the e-mail content was approved by the IRB at UNC-G. The initial recruitment e-mail was sent on April 28, 2017. One disadvantage to e-mail recruitment was that participants

may have changed or deleted the e-mail on file with the NCBON and there was no means for forwarding the e-mails.

To encourage participation, the researcher initially included the survey URL in the initial e-mail invitation, sent e-mail reminders two weeks after the initial invitation to participate and offered eight $25.00 Amazon gift cards as incentives to be awarded following a random drawing of interested participants. After indicating their desire to participate in the random drawing, RNs will be transferred to a separate survey to ensure that their e-mail address will not be associated with their survey responses.

Human Subjects Protection

Prior to recruiting registered nurses for this study, an application was made to the University of North Carolina at Greensboro (UNC-G) Institutional Review Board (IRB), and approval was granted to conduct this study. Each potential participant was informed about the study, including the risks and benefits, before electronic informed consent was obtained. The consent form, approved by the IRB (Appendix B) was included at the beginning of the Qualtrics survey. There were minimal risks to the study participants. These risks included the social risks that scores on the RH communication impairments knowledge questions would be released to the public, their peers, or their employer. It is unlikely that any harm occurred since these risks are minimal and the researcher could protect from these risks.

Participant names were not shared with anyone other than those involved in this study, and participants were not required to include their name unless they elected to apply for the gift card incentive drawing. No collected data were connected to a

participant's name. Participants were informed that this study was conducted in order to partially fulfill the requirements to obtain a PhD in Nursing degree. Information provided to participants emphasized the anonymity and confidentiality of all information. Each individual was informed of their right to refuse participation in the study.

Data Collection Procedure

After obtaining the contact information, the researcher contacted potential participants through e-mail. A link to participate in the study was included in the e-mail. Once participants opened the link, they were initially directed to the informed consent page. After accepting the study and clicking to provide consent, each participant proceeded to the survey. The survey was open for a period of four weeks pending adequate participation. Following this period, the survey was disabled.

Instrument

Participants completed one single questionnaire in Qualtrics (Appendix C). This questionnaire was comprised of three sections, demographics, knowledge of RHS associated communication impairments, and perception of barriers and facilitators to learning about RHS associated communication impairments. This section describes this survey.

Demographic Questions

The demographic information questions were developed for this study to determine individual participant characteristics. The specific information collected included the respondent's age, gender, highest level of education, self-report of education

about RHS associated communication impairments and area of nursing practice. Information was also obtained regarding the type of patient care area in which they work.

RHS Communication Impairment Knowledge Assessment

The participants answered 12 multiple-choice items, developed by the researcher, to assess knowledge of RHS associated communication impairments. These items were based on content from the literature review. The researcher conducted a comprehensive literature review using CINAHL, PUBMED, SCOPUS, and the linguistics databases using the search terms combinations: communication* AND right hemisphere stroke*, discourse* AND "right hemisphere stroke*," right hemisphere stroke* AND pragmatics*, and visual neglect* AND "right hemisphere stroke*". This review allowed the researcher to ensure that definitions align with earlier relevant research and to identify potential survey scales.

Following this literature review, the researcher searched the content maps for certification exams for rehabilitation nurses (CRRN), neuroscience nurses (CNRN), and stroke certified nurses (SCRN). Each of these exams listed communication as a topic; however, the content maps did not list RHS associated communication impairments specifically. For this reason, no content from these certification exams was used in the development of the survey. The researcher next researched National Council Licensing Exam RN (NCLEX-RN) review questions for questions about RHS associated communication impairments, and modelled survey questions in this section after NCLEX-RN questions focused on left hemisphere stroke (Silvestri, 2014).

These researcher-developed items pose challenges to both validity and reliability. The researcher next recruited three experienced nurse educators to review the questionnaire for clarity. Following this review, three experienced speech language pathologists and three experienced neuroscience nurses evaluated the survey questionnaire to assess both face and content validity. Face validity refers to whether the instrument looks as if it measures identified constructs (Polit & Beck, 2012). Content validity, essential in assessing validity of cognitive items such as the RHS communication impairment knowledge assessment items, involves the degree that the items asked represent the topic assessed (Polit & Beck, 2012). The SLPs were experienced in caring for RHS survivors and the nurses had worked in neuroscience nursing for a minimum of three years on a 32-bed neuroscience unit. The neurosciences unit has met the Joint Commission for the Accreditation of Hospitals and Healthcare Organizations (JCAHO) certification requirements as a certified stroke center and has achieved gold status from the American Stroke Association's "Get with the Guidelines" program. All reviewers will be acquaintances of the researcher and will be excluded from study participants.

Barrier and Facilitator Questions

The participants answered 20 barrier and facilitator questions from the Iranian Nurses' Motivation for Continuing Education Inventory [INMCEI] (Hamzehgardeshi & Shahhosseini, 2014) to assess perceived barriers and facilitators to participating in continuing education about RHS associated communication impairments. These questions were answered on a five-point Likert scale designated as very important,

moderately important, somewhat important, slightly important, and not at all important. Hamzehgardeshi and Shahhosseini (2014) developed the INMCEI establishing both face validity and content validity through interviews with experienced content experts. Construct validity was assessed after applying factor extraction to the items assessed. These authors performed factor analysis to denote items that would factor to facilitator, or barrier items. A Chi-square of 954.71 ($p<0.001$) was obtained (Hamzehgardeshi & Shahhosseini, 2014).

Data Analysis

The goal of the statistical analysis was to explore nurses' knowledge of communication impairments associated with RHS. All analyses were performed using SPSS v24 (IBM Corp., Armonk, NY). Univariate descriptive statistics were initially calculated including measures of central tendency, frequencies and percentages to describe demographic data.

Research question 1. What do NC registered nurses know about RHS communication impairments?

To determine knowledge of RHS associated communication impairments, scores on the 12 knowledge items were analyzed for each participant by calculating the percentage of questions answered correctly. Frequency distributions and percentages of population answering correctly were calculated for the individual items and topics surveyed to determine knowledge of specific communication impairments associated with RHS. SPSS was used in conducting an analysis of each multiple-choice item. This item analysis included item difficulty level (% answering item correctly) and Kuder-

Richardson 20 (KR20). The KR20, a measure of reliability for dichotomous data, was calculated for these 12 items. The KR20 suggests the degree that a test, when readministered, would generate an identical ranking of the test takers. The KR20 aids in establishing the internal consistency of a multiple choice test.

Research question 2 and 3. What barriers to learning about RHS are reported by NC registered nurses?

What facilitators to learning about RHS are reported by NC registered nurses?

A five point Likert scale was used to assess nurses' self-reported barriers and facilitators for learning with percentages calculated for each category of response. Descriptive statistics and cross tabulation contingency tables were used to identify the perceived barriers and facilitators to learning about communication impairments associated with RHS.

Research question 4. How do NC registered nurses anticipate using knowledge of RHS and communication impairments to change the nursing care for these patients?

The researcher evaluated question 4 using content analysis of the open-ended responses related to improvement of RHS patient care based on inservice education. The researcher examined the responses to the one open-ended question using conventional content analysis to identify major themes and descriptors regarding nurses' perception of changing their practice in caring for RHS survivors. The researcher exported the answers into a matrix using an Excel spreadsheet. Excel facilitated the movement and manipulation of these summaries so that themes may emerge. As the researcher made

decisions regarding emerging themes, the researcher consulted with the dissertation committee to verify theme interpretation.

The researcher maintained an audit trail consisting of field notes, decisions about themes, discussion of common ideas about implementing continuing education regarding RHS associated communication impairments throughout this research study. All of these items were maintained in the researcher's private laptop in word processing documents. The audit trail was kept current and available to the dissertation committee at any time.

Pilot Study

The researcher-developed tool posed a challenge for collecting reliable data. Early in the research process, the researcher determined a need to test this instrument in a pilot study. The purpose of this pilot study was to provide an early evaluation of the usefulness of the research instrument, along with establishing validity and reliability of the 12 knowledge items, and evaluation of the data collection processes to better understand RN knowledge of communication impairments associated with strokes affecting the brain's right hemisphere (RHS). An additional aim was to help establish validity and reliability of the survey. Based on the current research regarding RHS communication impairments, a pilot study was needed to evaluate the instruments with a selected group of RNs. This section begins with a discussion of the pilot sample followed by presentation of the pilot study results.

During the initial planning phase for this study, the researcher identified a group of experienced rehabilitation RNs to participate in the pilot study. This purposive sample of 34 RNs were members of one of the N. C. chapters of the Association of Rehabilitation

Nurses and contacted by the researcher to secure participation in the pilot study. The initial request for participants from this purposive sample yielded slow response. After data collection was open for two weeks, with few responses, the chapter president recruited RN participants in attendance at a regional workshop on rehabilitation nursing. This second group was asked to contact the researcher by e-mail indicating their interest to participate. Fourteen RNs from this second group requested to participate. The researcher sent an email to these 14 RNs. Inclusion criteria for this pilot study included: (a) registered nurse practicing in N. C., and (b) experience with rehabilitation nursing care. These rehabilitation nurses answered the research instrument only and data used from this pilot was used to establish ease of use for the instrument. Prior to recruiting participants in this pilot, the researcher gained the approval of UNC-G's IRB.

Summary

Large numbers of people survive RHS annually and RNs are responsible for caring for these patients throughout their recovery and rehabilitation. RHS survivors demonstrate communication impairments that can negatively influence their understanding and participation in their care. The researcher believes that there is inadequate nursing literature addressing this phenomenon and that there exists a need to establish RN knowledge of RHS associated communication impairments and to determine how RNs may intend to use knowledge of these deficits in their care of RHS survivors.

CHAPTER IV

RESULTS

The purpose of this study was to examine the knowledge that registered nurses (RNs) in North Carolina possess about the communication impairments associated with strokes affecting the brain's right hemisphere (RHS) and how these nurses anticipate using knowledge gained about these impairments in the care of patients surviving RHS. Additionally the study examined perceived barriers and facilitators to the RNs participating in continuing education about RHS associated communication impairments. This study was completed in two parts, a pilot study to evaluate the validity of the researcher developed survey, and a second study of a larger population of nurses to assess data to answer the study's research questions. The pilot study is presented first, followed by the statistical analysis of results of the larger study.

Pilot Sample

Forty-eight RNs were recruited for the pilot study; however, only fourteen responded to the participation invitation, a response rate of 29%. Of these 14, no participants answered the demographic questions to indicate age, gender, or highest level of RN education. One hundred percent of the fourteen participants were licensed RNs working in North Carolina. The majority of these participants reported working in an in-patient rehabilitation setting. Nurses working in a skilled nursing facility and in medical

surgical nursing also participated in this pilot study. The work setting for this pilot group is reported in Table 1.

Table 1

Work Setting Pilot Sample

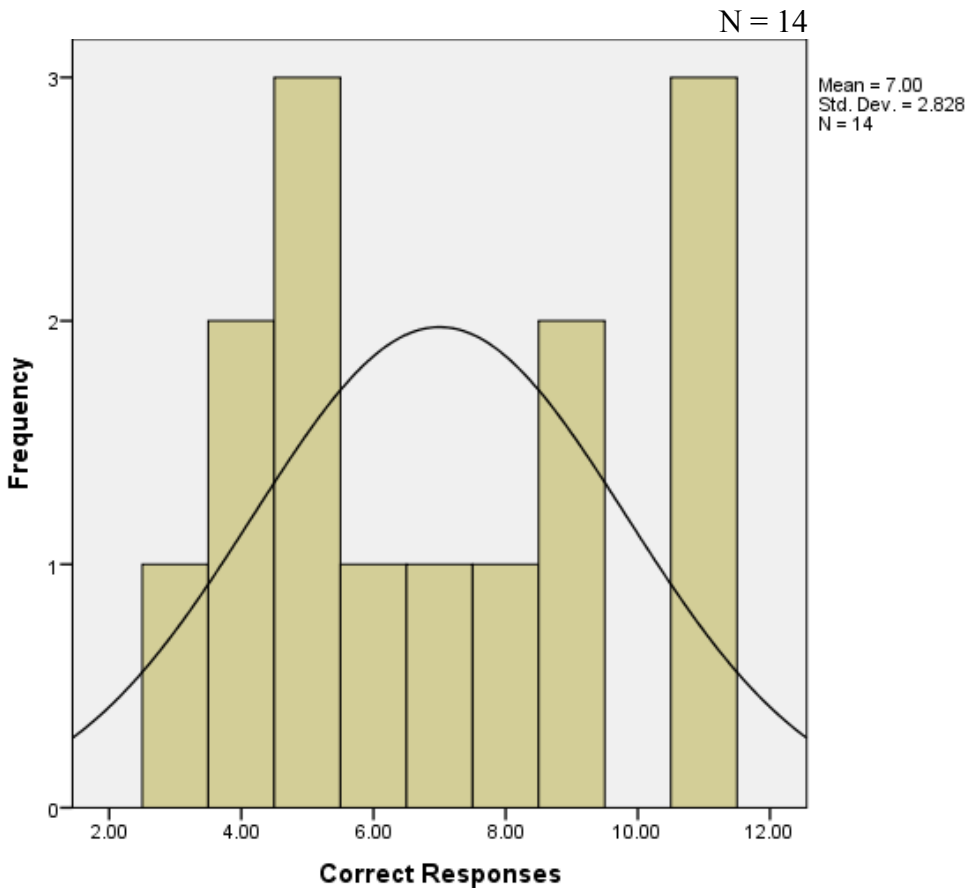
	N = 14
Setting	n(%)
Medical-surgical nursing	1 (7.1)
In-patient rehabilitation	12(85.7)
Skilled nursing facility	1 (7.1)

Knowledge Results

Knowledge of RHS associated communication impairments was assessed through 12 questions focused on discourse skills, prosody, neglect, and anosognosia. Each of these areas impacts communication in the survivor of an RHS. Four questions addressed discourse, two questions addressed affective prosody, and anosognosia and neglect were each assessed using three questions for the respective categories. Frequency distributions and percentages of the sample answering correctly were calculated for all 12 questions. To assess reliability of the 12 knowledge items, these were first numerically coded into dichotomous variables, with 1 indicating a correct response and 0 indicating an incorrect response. The raw scores ranged from 3 to 11 questions answered correctly with a mean of 7. This data is reflected in Figure 1.

Figure 1

Pilot Study RHS Knowledge Questions Answered Correctly



To determine knowledge of the specific communication impairments associated with RHS, frequencies and descriptive statistics were calculated for the individual questions and topics. Participants scored higher on the three neglect questions than the other three areas. Participants also scored well on affective prosody. The four questions assessing knowledge of discourse demonstrated a wider variability in item scores suggesting that discourse was a less known topic with this group. The percentages of the pilot sample answering these 12 questions correctly is presented in Table 2.

Table 2

Pilot Study Knowledge Questions Answered Correctly

N = 14

Topic Addressed	Question Number	Percent Correct
Discourse	1	78.60%
Discourse	2	28.60%
Discourse	3	71.40%
Discourse	4	42.90%
Anosognosia	1	50%
Anosognosia	2	71.40%
Anosognosia	3	42.90%
Prosody	1	64.30%
Prosody	2	57.10%
Neglect	1	85.70%
Neglect	2	64.30%
Neglect	3	28.60%

Reliability of Knowledge Items

Reliability is a concern when using a new instrument in research. As stated previously, the 12 knowledge items, were first numerically coded into dichotomous variables, with 1 indicating a correct response and 0 indicating an incorrect response. The Kuder-Richardson-20 (KR-20), a measure of reliability for dichotomous data, was calculated for these 12 items. The KR-20 suggests the degree that a test, readministered, would generate an identical ranking of the test takers. This is considered to be the discrimination power of the test. The KR-20 for the 12 items of the RHS Knowledge

assessment was 0.710. For short tests (10 – 15 items, a KR-20 value of 0.5 or higher is deemed satisfactory; however for tests with greater than 50 items, a KR-20 of 0.8 or higher is desirable (Kehoe, 1995). These results suggest that the 12 knowledge items have a satisfactory reliability.

Barriers and Facilitators

A five point Likert scale was used to assess nurses' self-reported barriers and facilitators for learning. Descriptive statistics were used to identify the perceived barriers and facilitators to learning about communication impairments associated with RHS. One of the fourteen participants chose not to answer this series of questions. Twelve participants (85.7%) agreed or strongly agreed that they needed additional education regarding RHS communication clusters. The primary barriers and facilitators to education assessed were family and work responsibilities and support with both family and work identified as both a barrier and a support for participating in education. The pilot survey focused primarily on work and family as barriers and facilitators. This data is reported in Table 3.

Table 3

Pilot Study: Facilitators and Barriers to Participating in Education about RHS Communication Clusters

N = 14

Behavior	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
	n(%)	n(%)	n(%)	n(%)	n(%)
Need education on RHS Communication	2 (14.3)	10 (71.43)		1 (7.1)	
Family Supports participating in education about RHS Communication	2 (14.3)	9 (64.3)	2 (14.3)		
Employer will Provide Time Off to participate in education about RHS Communication	1 (7.1)	3 (21.4)	5 (35.7)	4 (28.6)	
Need education on RHS Communication	2 (14.3)	10 (71.43)		1 (7.1)	
Family Responsibilities interfere with participating in education about RHS Communication	1 (7.1)	3 (21.4)	3 (21.4)	6 (42.9)	
Work Responsibilities interfere with participating in education about RHS Communication		4 (28.6)	4 (28.6)	5 (35.7)	

Impact of Self-Assessment on Nursing Care

The researcher evaluated question 4 using qualitative analysis of the open-ended responses to the question, “if you answered ‘my care would change’, how would you

anticipate this information changing your nursing practice." Initially the researcher exported the study responses into Excel and focused the Excel file to include only the responses to the question "How would you anticipate this information changing your nursing practice?" The majority of participants answered this question with only one sentence. The data was manipulated to identify common themes in the responses.

Three themes emerged from this analysis: awareness of the need for education on this topic, reeducation would improve care, and the patient and family. Awareness of the need for education, the first theme, was demonstrated by the response, "This has enlightened me that I need reeducation in stroke". The second theme was identified by four participants who indicated that reeducation would improve their care. This was reflected in a comment from participant number five who stated, "I would be able to intervene more effectively to help with specific problems associated with right brain deficits." The third theme that emerged, the patient and family, was evidenced by two participants who focused on support and education for the patient and family. Both of these care aspects are important in dealing with the life changes associated with stroke.

Pilot Summary

The RHS Communication Knowledge Assessment and the Barriers and facilitators items of the survey tool yielded useful information regarding RNs' knowledge of communication impairments associated with strokes affecting the brain's right hemisphere. The experienced rehabilitation nurses in this small pilot study demonstrated a need for additional education on the four knowledge topics, discourse, anosognosia, prosody, and neglect. These 12 items demonstrated a satisfactory reliability level with a

KR-20 of 0.710. The pilot sample identified a need to learn more about the communication impairments associated with RHS. Assessing barriers and facilitators revealed conflicting information about the influence of both family and work on their participation in continuing education about RHS communication impairments. Following this pilot, the researcher modified the survey by adding additional barrier and facilitator items to include in assessment. With the documented interest in education, participants indicated they would use this knowledge to improve their care of these patients either through patient and family education or patient and family support. In using this instrument in additional research, the PI recommends: requiring a response for the demographic items, including additional barriers and facilitators to the tool and sending reminder e-mails at one and two weeks after the initial email invitation.

Full Study

This section presents the statistical analyses of study data. Initially, the study sample is described in detail. Following this description, the study results are presented including descriptive statistics analyzing the results for each research question.

Sample

Study participants were RNs licensed in North Carolina. The list of potential participants was obtained from the N.C. Board of Nursing. Email invitations were sent to 62,998 RNs meeting the inclusion criteria with data collection occurring during a three week period during the spring of 2017. Initially 4872 RNs opened the survey for a response rate of 7.7%; however, 253 elected not to participate in the study, and 702 were excluded because they answered that they did not meet the inclusion criteria of working

as an RN in N.C. Additionally, RNs who did not meet the inclusion criteria for work setting were excluded. This included 619 critical care nurses, 206 pediatric nurses, 148 maternal-child nurses, and 124 employed in mental health nursing. The survey was open for data collection from April 28, 2017 through May 18, 2017. The final sample consisted of 2495 RNs licensed in N. C., and the response rate was 3.9%.

Preliminary Data Examination

Survey responses were collected using Qualtrics software. Data analyses were completed using International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) software version 24 (IBM Corp., Armonk, NY)**.** Frequencies and descriptive statistics were calculated on all variables to assess for distribution characteristics and missing data.

Sample Demographics

Of the 2495 participants, demographic data was missing on 890 nurses. Of the remaining 1605 participants, the majority (94.5%, n =1516) were females and 1161 (72.4%) were between 35 and 64 years of age. Participants' highest level of nursing education ranged from Associate degree to Doctoral degree. Diploma was not an option for education level. The demographic data is reported in Table 4.

Table 4

Demographic Characteristics of Participants

N = 1605

Characteristic	N	%
Age at time of survey (in years)		
Under 25	37	2.3
25 – 34	264	16.4
35 – 44	364	22.7
45 – 54	391	24.4
55 – 64	406	25.3
65 – 74	133	8.3
75 or older	10	0.6
Gender		
Male	89	5.5
Female	1516	94.5
Highest level of nursing education		
Associate Degree	576	35.9
Bachelor's Degree	692	43.1
Master's Degree	297	18.5
Doctorate	36	2.2

Nursing Experience

Participants were asked to select their current area of practice within an acute care setting. Overall, more participants reported employment in the medical-surgical nursing (66.4%, n = 1658) than any other area of practice. Home health nursing was the second highest work area reported. Eighty-four nurses reported working in an in-patient rehabilitation setting (4.1%). The work setting for this population is reported in Table 5.

Table 5

Work Setting

	N = 2495
Setting	n(%)
Medical-surgical nursing	1658(66.4)
Home Health	468(18.7)
Skilled nursing facility	246(9.9)
In-patient rehabilitation	84(3.4)
Assisted living center	41 (1.6)

Participants reported working in nursing ranging from less than 5 years to greater than 45 years, with the greatest number of respondents reporting working 5 – 9 years (15.1%), less than 5 years, and 10 – 14 years. This question was not answered by 899 participants. This data is reported in Table 6.

Table 6

Nursing Experience

	N = 1598
	Years as RN n(%)
Less than 5 years	232(14.5)
5 - 9 years	241(15.1)
10 - 14 years	209(13.1)
15 - 19 years	150(9.4)
20 - 24 years	175(11.0)
25 - 29 years	157(9.8)
30 - 34 years	136(8,5)
35 - 39 years	136(8.6)
40 - 44 years	105(6.6)
Greater than 45 years	57(3.6)

Experience Working with Patients who have Sustained a Stroke

The researcher questioned respondents to determine if they had received education in in their undergraduate education regarding communication impairments associated with RHS. Of the 1561 respondents answering this question, a majority (78.2%, n = 1221) responded yes. Next, the researcher queried respondents regarding their experience in caring for patients who had experienced a stroke. The first question asked if participants had worked with patients following a stroke within the most recent 12 months. The majority of respondents reported that in the most recent 12 months they had cared for a patient who had sustained a stroke (66.8%, n = 1066); however, 692(44.2%) nurses reported that less than 10% of their assigned patients had sustained a stroke. Eight participants chose not to provide a response for this question. A second question asked the length of time participants had cared for patients surviving a stroke. The majority of participants reported that they had cared for patients following a stroke from 0 – 14 years (64.3%, n = 1248), with 916 nurses electing not to respond to this question. This data is reported in Table 7.

Table 7

Experience Caring for Patients who had Sustained a Stroke

	N = 1581
Years of Experience	
	n(%)
Less than 5 years	500 (31.6)
5 - 9 years	295(18.7)
10 - 14 years	221(14.0)
15 - 19 years	133(8.4)
20 - 24 years	141(8.9)
25 - 29 years	88(5.6)
30 - 34 years	83(5.2)
35 - 39 years	61(3.9)
40 - 44 years	44(2.8)
Greater than 45 years	15(0.9)

Lastly, the researcher asked what percentage of patients had sustained a stroke. Participants reported that survivors of stroke represented a small percentage of their patients with 692 respondents (44.2%) indicating that stroke survivors represented less than 10% of their patients and an additional 574 (36.7%) reporting that 10 – 25% patients had sustained a stroke with 931 respondents choosing not to respond.

Research question 1. What do NC registered nurses know about RHS communication impairments?

To determine knowledge of RHS associated communication impairments, scores on the individual knowledge items were analyzed for each question by calculating the percentage of participants answering the item correctly. Frequency distributions and percentages of population answering correctly were calculated for the individual items

and topics surveyed to determine knowledge of specific communication impairments associated with RHS. The questions were identical to those in the pilot survey and assessed knowledge of discourse skills, anosognosia, prosody, and neglect. Participants scored higher on the three neglect and affective prosody questions than the other three areas. Participants also scored well on the three questions regarding anosognosia. The four questions assessing knowledge of discourse demonstrated a wider variability in item scores suggesting that discourse was a less known topic with this group. Participants demonstrated difficulty (less than 50% answered correctly) with three questions. The first question (discourse 2) addressed discourse and asked for a description of the communication behavior associated with RHS. Only 27.8% of participants identified difficulty following conversational cues as a common behavior seen following RHS. A second question (anosognosia 3) focused on planning long term care for a patient experiencing anosognosia with 40.7% of RNs correctly responded to help the client accept the decrease in their physical abilities. Lastly, participants demonstrated difficulty identifying a nursing intervention to promote long term safety in a patient demonstrating a strong right gaze preference commonly seen with neglect (neglect 3). Forty percent of participants correctly identified performing passive range of motion to the neck. The percentages of the sample answering these twelve questions correctly is presented in Table 8.

Table 8

RHS Knowledge Questions Answered Correctly

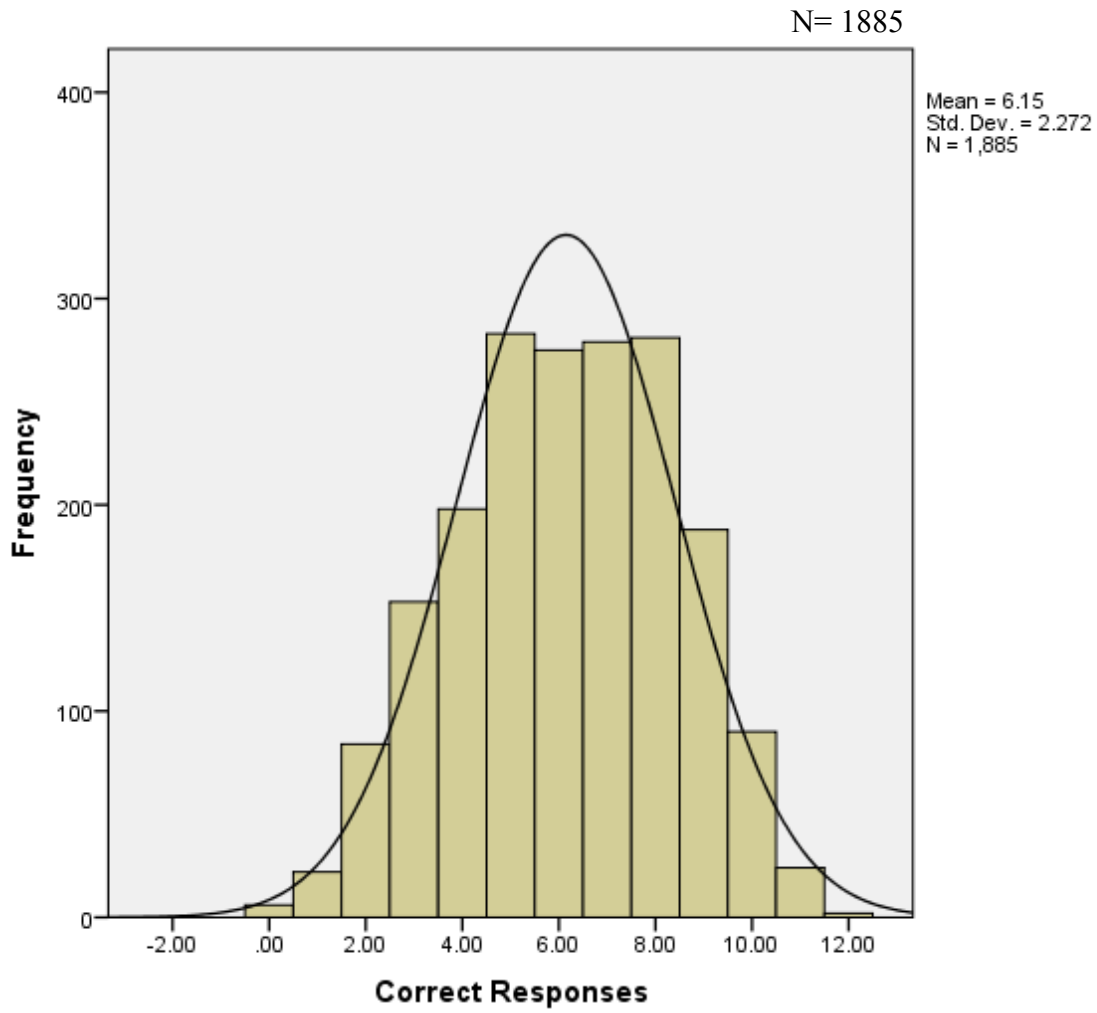
N = 2495

Topic Addressed	Question Number	Correct Response	Missing
		n (%)	n
Discourse	1	1675 (73.1)	207
Discourse	2	589 (27.8)	378
Discourse	3	1245 (60.9)	452
Discourse	4	1061 (54.5)	551
Anosognosia	1	1203 (53.6)	251
Anosognosia	2	1284 (64.0)	492
Anosognosia	3	798 (40.7)	534
Prosody	1	1428 (64.5)	282
Prosody	2	1267 (62.6)	473
Neglect	1	1127 (52.1)	332
Neglect	2	1129 (57.1)	520
Neglect	3	779 (40.4)	567

The researcher numerically coded the variables reflecting knowledge on these four areas to determine the overall raw score for each participant on the twelve questions. The variables were recoded as dichotomous variables with 1 indicating a correct response and 0 coded as an incorrect response for each question. The correct responses ranged from 0 to 12 correct responses with a mean of 6.189. This data is reported in Figure 2.

Figure 2

RHS Knowledge Questions Answered Correctly



As stated earlier with the pilot study there was a need to assess reliability of the 12 knowledge items. Again, the items were coded as dichotomous data with 1 indicating a correct response and incorrect responses coded as 0. The Kuder-Richardson-20 (KR-20), a measure of reliability for dichotomous data, was calculated for these 12 items. The KR-20 suggests the degree that a test, when readministered, would generate an identical

ranking of the test takers. This is considered to be the discrimination power of the test. The KR-20 for this 12 item of the RHS Knowledge assessment was 0.532, which was a decrease from the value determined with the pilot study. For short tests (10 – 15 items), a KR-20 value of 0.5 or higher is deemed satisfactory; however for tests with greater than 50 items, a KR-20 of 0.8 or higher is desirable (Kehoe, 1995).

Research questions 2 and 3. What barriers to learning about RHS are reported by NC registered nurses?

What facilitators to learning about RHS are reported by NC registered nurses?

A five point Likert scale was used to assess nurses' self-reported barriers and facilitators for learning. Descriptive statistics were used to identify the perceived barriers and facilitators to learning about communication impairments associated with RHS. Determining facilitators began with participants initially reporting their self-identified need as well as their interest in this learning about communication impairments associated with strokes affecting the brain's right hemisphere. The majority of participants (87.1%, n = 1607) agreed or strongly agreed that they needed additional education regarding RHS communication clusters, with 652 nurses choosing not to answer this question. A second question asked participants about their interest in receiving education about the communication challenges occurring after RHS. While 656 participants elected not to answer this question, 1330 (72.2%) nurses agreed or strongly agreed that they were interested in learning more about these communication challenges.

The researcher asked about the following facilitators to participating in continuing education, to improve my care, to improve my decision making skills, and to increase my competency in caring for these patients. Two additional facilitators assessed included family support for participation in continuing education and employer providing time off for participation. Of these potential facilitators, the majority of participants agreed or strongly agreed that updating knowledge will help to provide better care, improve their decision making in the care of these patients, and would increase their competence in caring for survivors of RHS. Family support also was evaluated as a strong facilitator for participating in education (66.7%, n = 1277); however, participants responded negatively that their employer would provide time off to attend education programs (25.02%, n = 460). These results are reported in Table 9.

Table 9

Perceived Facilitators to Participating in Continuing Education about RHS Communication Clusters

N = 2495

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	No Answer
	n (%)	n (%)	n (%)	n (%)	n (%)	
I need education on the symptom of right hemisphere (RH) stroke	609 (33.0)	998 (54.1)	126 (6.8)	37 (2.0)	75 (4.1)	652
I am interested in receiving education on these communication challenges	358 (19.4)	972 (52.8)	355 (19.3)	93 (5.1)	63 (3.4)	656
Updating my knowledge will change my nursing care.	436 (23.7)	1019 (55.3)	284 (15.4)	48 (2.6)	55 (3.0)	655
Updating my knowledge will help me to provide better care.	566 (30.8)	1074 (58.5)	147 (8.0)	19 (1.0)	307 (1.6)	661
Updating my knowledge will improve my decision making in the care of these patients.	490 (28.9)	1058 (58.1)	227 (12.5)	17 (0.9)	28 (1.5)	677
Increase my competency with survivors of right hemisphere strokes.	350 (19.1)	960 (52.3)	319 (17.4)	129 (7.0)	77 (4.2)	662
Family supports participation.	274 (14.9)	953 (51.8)	496 (27.0)	75 (4.1)	42 (2.3)	657
Employer will provide time off for attendance	68 (3.72)	392 (21.3)	568 (30.9)	533(29.0)	278 (15.1)	658

Barriers assessed included physical health, time limitations, travel to workshops, adequate education on-the-job, cost of educational programs, as well as family and work responsibilities. Of these perceived barriers, more participants agreed or strongly agreed that work responsibilities (32.9%, n = 605) and family responsibilities (23.7%, n = 436) interfered with participation in continuing education about communication clusters associated with RHS. A third barrier, cost of courses, was identified by participants (23.5%, n = 431) as interfering with their participation in these education programs. Physical health, time limitations, travel to workshops, and adequate education on-the-job education were not identified as barriers. These results are presented in Table 10.

Table 10

Perceived Barriers to Participating in Continuing Education about RHS Communication Clusters

N = 2495

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	No Answer
	n (%)	n (%)	n (%)	n (%)	n (%)	n
My work responsibilities	123 (6.7)	482 (26.2)	565 (30.7)	526 (28.6)	144 (7.8)	657
My family responsibilities	83 (4.5)	353 (19.2)	625 (33.9)	615 (33.4)	165 (9.0)	656
Cost of courses.	58 (3.2)	373 (20.3)	693 (37.8)	511 (27.8)	200 (10.9)	662
My physical health.	23 (1.3)	61 (3.3)	238 (13.0)	848 (46.3)	663 (36.2)	664
Time limitations.	52 (2.8)	296 (16.1)	471 (25.7)	710 (38.7)	305 (16.6)	663
Travel distance to programs.	42 (2.3)	326 (17.8)	679 (37.1)	542 (29.6)	243 (13.3)	665
My job satisfies this with on the job training.	18 (1.0)	107 (5.8)	481 (26.2)	868 (47.4)	359 (19.6)	664
My peers do not attend continuing education.	16 (0.9)	54 (2.9)	351 (19.1)	860 (46.9)	553 (30.2)	663
Previous experiences with continuing education.	28 (1.5)	89 (4.8)	361 (19.7)	833 (45.4)	525 (28.6)	661

Research question 4. How do NC registered nurses anticipate using a knowledge self-assessment of RHS and communication impairments to change the nursing care for these patients?

The researcher evaluated question 4 using qualitative analysis of the open-ended responses to the question, "If you answered 'my care would change', how would you anticipate this information changing your nursing practice?" Initially the researcher exported the study responses into Excel and focused the Excel file to include only the responses to the question "How would you anticipate this information changing your nursing practice?" The majority of participants answered this question with only one sentence. The researcher manipulated the data within Excel to identify common themes in the responses.

Three major themes emerged from this analysis: awareness of the need for education on this topic including educating one's self, improved nursing management including patient teaching and critical thinking, meet these patients' specific needs, better communication with survivors of RHS, improved empathy, and the patient and family.

1. *Awareness of the need for education,* which describes the RNs' self-assessment of education need was demonstrated by the response, "Becoming more aware of what to expect and behave in ways that you just taught us".
2. *Improved nursing management of patients, including patient teaching and critical thinking reflected* the application of all phases of the nursing process in providing care for RHS survivors. This was reflected in a comment from participant number five who stated, "Have a better understanding of

appropriate goals and interventions for stroke patients. Promote safety for the patient. My lack of knowledge puts patients at risk at this time." This theme also included improved empathy for patients to better understand the patient's experiences and feelings from the patient's point of view which was evidenced in this participant's comment, "I would have a better understanding of the challenges my patient faces and the support he needs. I would be a better advocate for my patient." The patient and their family were at the center of this theme.

3. *Better communication with survivors of RHS* manifests in the desire to communicate with these patients and to understand how the patient can best communicate. One comment that reflects this theme was, "Understanding how they are able to process information and understanding why their affect is the way it is."

Summary

A sample of 2495 RNs employed in N. C. were surveyed using the RHS Knowledge, Assessment of Barriers and Facilitators Tool. In this sample, nurses' knowledge of communication clusters associated with strokes affecting the brain's right hemisphere and perceived barriers and facilitators to learning about these communication clusters were explored. Additionally, this study explored how RNs perceive that they would use knowledge gained about these patients. The majority of participants were female with a bachelor's degree as their highest nursing degree. Medical-surgical nursing

was reported as the work setting for most of the participants with the majority of nurses reporting that they had care for survivors of stroke within the most recent 12 months.

The mean score on the knowledge assessment ranged from 0 to 12 corrects responses with a mean of 6.15. Participants scored the highest on questions addressing neglect. Discourse was the most difficult topic assessed. Participants self-identified that they needed to learn more about these deficits.

Participants identified both an interest in learning about RHS associated communication impairments and that they needed to learn more about this topic to better care for their patients. Other strong facilitators for participating in education on RHS associated communication impairments included: improve decision-making skills, provide better care to these patients, and family support. Perceived barriers included work responsibilities, family responsibilities as well as the cost of courses.

Nurses reported that they would use education on these communication impairments to change the care that they provide. Nurses indicated that learning more on this topic was important to them and that they would improve their nursing management of these patients. The also indicated that additional education on this topic would improve their critical thinking skills, better meet the patients' specific needs, and demonstrate empathy for these patients.

CHAPTER V

DISCUSSION

The purpose of this study was to examine the knowledge that registered nurses (RNs) in North Carolina possess about the communication impairments associated with strokes affecting the brain's right hemisphere (RHS) and how these nurses anticipate using knowledge gained about these impairments in the care of patients surviving RHS. The study also explored RNs perceived barriers and facilitators to participating in continuing education about RHS associated communication impairments. The RHS Communication Impairment Knowledge Assessment tool was used to assess knowledge, perceived barriers and facilitators to participation, and intent to use knowledge gained. This chapter discusses the interpretation of the results followed by a presentation of the recommendations for nursing practice, education, policy, and for future research. Finally, the study limitations are presented.

Interpretation of the Findings

This study of N. C. RNs knowledge of communication impairments associated with RHs yielded interesting findings regarding the sample. As expected, the majority of participants were female (94.5 %). This is slightly higher than data reported in the 2015 nursing workforce description published by the National Council of States Boards of Nursing in which the number of males recently licensed increase from 4.7% in 2000 to 12.7% in 2015. The greater percentage of RNs in this sample were ages 35 – 64 (72.4%)

("Executive Summary," 2016). This finding is higher than that reported in the 2015 Workforce study in which 41.9% of licensed RN participants reported this same age range ("Executive Summary," 2016). The active work force in N.C. is higher than that reported nationally. Most participants reported working in medical-surgical nursing (66.4%). Even though 78.2% reported that they had received education about communication impairments associated with right hemisphere stroke the findings revealed a knowledge deficit related to the care of patients following RHS.

Research Question 1

What do NC registered nurses know about RHS communication impairments?

The RN participants demonstrated a knowledge level of 6.15 (SD = 2.272) out of a possible maximum score of 12 points using RHS Communication Impairment Knowledge Assessment. These results confirmed that N.C RNs have an educational need regarding communication clusters associated with RHS. Research conducted in the speech language domain has demonstrated that the subtle communication disorders resulting from RHS occur in 50% of patients (Ferré, Fonseca, Ska, & Joanette, 2012b; Mackenzie & Brady, 2008b; Saldert & Ahlsén, 2007). With this large prevalence rate for RHS associated communication impairments, there is clearly a need for RNs to be knowledgeable in the care management for these patients.

Participants scored the highest on the simpler knowledge questions that defined the impairments. In contrast, they demonstrated difficulty with the higher level questions that applied this basic information to patient care management. The percentages of nurses answering these application questions correctly was lower than those answering

basic knowledge and definition questions correctly. Three questions were answered correctly by less than 50% of participants. The first question (discourse 2) addressed tangential discourse and asked for a description of the communication behavior associated with RHS. Only 27.8% of participants identified difficulty following conversational cues as a common behavior seen following RHS. Discourse deficits are one of the more common communication manifestation following RHS (Hinckley, 2014; Sherratt & Bryan, 2012). This common manifestation needs to be recognizable by nurses to best provide care and to aid these patients in effective communication.

A second question (anosognosia 3) focused on planning long term care for a patient experiencing anosognosia and 40.7% of RNs correctly responded to help the client accept the decrease in their physical abilities. The pathological denial seen with anosognosia can lead to the patient experiencing RHS to have delays in treatments for problems associated with RHS (Cutting, 1978; Gardner et al., 1983). Promoting acceptance of any decreased ability resulting from stroke may promote the RHS survivor to seek treatment more readily.

Lastly, participants demonstrated difficulty identifying a nursing intervention to promote long term safety in a patient demonstrating a strong right gaze preference commonly seen with neglect (neglect 3). Forty percent of participants correctly identified performing passive range of motion to the neck. Survivors of RHS often present with an inability to gather information from the left side of their environment and demonstrate a strong gaze preference to the right (Al-Mahasneh, 1991; G. Myers, 1991; P. S. Myers & Blake, 2008; Myers & Sperry, 1958; Vromen et al., 2011). This gaze

preference warrants nursing care to encourage these patients to consider the left side of their environment. The strong right gaze preference may lead to contractures of the neck. Passive range of motion is one strategy to prevent these contractures.

As noted earlier, the KR20 score dropped from 0.710 with the pilot study to 0.532. Both KR20 scores above the satisfactory level for short item tests established by Kehoe (1995); however, the pilot sample reported more experience with stroke and work experience in rehabilitation nursing, and the heterogeneity of the sample in the full study may both contribute to this decrease.

Nurses demonstrated a higher level of knowledge than the researcher anticipated which is beneficial for patient care; however, these results still reflect a knowledge gap regarding these communication impairments. The decreased knowledge in the RNs participating in this study reflects a need for education on these impairments and patient care strategies to care for these patients. With one-half of patients sustaining a RHS exhibiting at least one of the communication impairments associated with RHS, these findings indicate a need for nurses to have a stronger knowledge base of how these impairments present and how to best manage these patients' care.

Research Question 2

What barriers to learning about RHS are reported by NC registered nurses?

Participants agreed or strongly agreed that work responsibilities (32.9%), family responsibilities (23.7%), and cost of courses (23.5%) were the most frequently reported barriers to participating in continuing education on this topic. While the results for work responsibilities, family responsibilities, and course costs were less frequently reported

barriers, these areas are consistent with barriers previously reported in the literature; however, these percentages are lower than those reported in earlier research studies. Nalle, Wyatt, and Myers (2010) identified that cost of continuing education programs (74%), difficulty taking time off from work (56%) as well as home responsibilities and child care were all frequently reported by nurses as barriers to continuing education.

Work responsibilities as a barrier, is an example of a subjective norm from the Theory of Planned Behavior. Subjective norms, much like attitudes, strongly influence the intention to perform a behavior (Ajzen, 1991, 2005). There are possible explanations for the divergence in these findings than from other studies found in the literature. The high value that the nurses in this sample place on the positive impact of knowledge on patient care may serve to account for this variance; however, it is important to provide accessible education on this topic. Controlling cost of courses and employer value of continuing education may promote nurses' attendance and participation in continuing education on RHS associated communication impairments in the future. To best encourage nurses to participate in continuing education in this topic, nurses also need encouragement in the workplace as well as appropriate education programs that are available at a reasonable cost.

Research Question 3

What facilitators to learning about RHS are reported by NC registered nurses?

After reviewing a self-assessment of their knowledge of communication clusters associated with RHS, participants identified a need and interest in learning more about RHS associated communication impairments. In harmony with the concepts contained in

Ajzen's Theory of Planned Behavior, there is a strong relationship between one's attitude toward a behavior and one's intent to perform the behavior. Intent to perform the behavior often leads to the actual behavior being adopted (Ajzen, 1991, 2005). The desire to learn serves as a positive step in developing an attitude for learning and can also function as increased motivation to learn about RHS communication impairments. Participating nurses also identified that updating their knowledge would improve their nursing care and increase competency with patients following RHS. This finding is similar to previous research conducted with nurses to determine reasons for participating in continuing professional development. Nalle, et al reported similar findings with improved knowledge and skill identified as a facilitator (83%), critical thinking and decision making (64%), and better patient outcomes (52%) (2010). (Pool et al., 2016) conducted a qualitative study and found that nurses reported both increasing competency and deepening of their knowledge as reasons to participate in continuing education (2016).

Nurses in this sample demonstrated a high value on continuing education about this topic with very few reported barriers to their participation. Continuing education offerings that focus on the nurse's identified needs would aid in filling identified gaps in their knowledge and practice (DeSilets, 1995; Lubejko, 2015). Additionally, personal interest in a topic is a strong motivator (43%) to participation (Nalle et al., 2010).

Implications for Theory

This exploratory, descriptive study was influenced by Ajzen's Theory of Planned Behavior (Ajzen, 1991, 2005). This theory describes the impact of attitudes, subjective

norms, and perceived behavioral controls on intentions to perform a behavior. The Theory of Planned Behavior implies that attitudes, subjective norms, and perceived behavioral controls all have a predictive quality towards individuals performing a desired behavior (Ajzen, 1991, 2005).

The participants in this study demonstrated a strong attitude toward the desired behavior, learning about communication clusters associated with RHS. These nurses expressed the belief that learning was valuable and important to providing competent patient care. Beliefs and expectations, components on one's attitude, are both determinants of intention and behaviors (Hung et al., 2016). Ajzen's Theory of Planned Behavior proved to be helpful in influencing data collection and the analysis of RNs' responses to the RHS Knowledge survey (Ajzen, 1991, 2005).

Impact of Perceived Education on Nursing Care

Responses to the open-ended question, "how would you anticipate this information changing your nursing practice?" yielded a variety of responses. Participants' responses revealed three themes as discussed in the previous chapter. This section explores the meanings of these three themes in relation to current theory and past research.

Themes

Awareness of the need for education. The first theme that emerged described how participants viewed the importance of education and increased knowledge. RNs in this sample overwhelmingly expressed an awareness of the need for additional education on communication clusters associated with RHS. Knowledge was described as power

and an increase in knowledge would benefit patients. The survey was identified as a tool that increased these nurses' awareness of the need for education on the impact of RHS on communication and the care needs of this patient population. This group of nurses demonstrated a high regard for additional knowledge and the impact of education on patient care.

These findings are consistent with those in a qualitative study by Pool et al. (2016). In this study, nurses identified the importance of continuing education to supplement gaps in previous education. Pool et al. found that nurses self-identified their knowledge gaps and sought to find education to supplement these gaps (2016).

As discussed earlier, this positive attitude toward learning about communication clusters associated with RHS fits well into Ajzen's Theory of Planned Behavior (Ajzen, 1991, 2005). The positive attitude toward learning may lead to the RN seeking out additional information about the topic. At least one of the participants answered "I need to conduct further research regarding stroke patients."

Improved nursing management of patients, including patient teaching, and critical thinking. Nurses in this sample highly regarded the importance of providing nursing care to meet the needs of their patients. These nurses expressed the importance of the role of additional knowledge communication on patient care, reflecting all aspects of the nursing process, and identified that additional knowledge would impact both patient assessment and patient teaching. An additional finding with this theme included increased empathy so that nurses could better understand the challenges these patients face and the support needed. Again Pool et al. (2016) reported similar findings citing that

continuing education was a valuable tool to promote nurses gaining and maintaining knowledge of patient care issues. Continuing education is also important in providing safe patient care (Pool et al., 2016).

Nurses in this study reported a strong regard for education and its impact on their patient care. Basic nursing education programs focus teaching on the beginning skills of the nurse generalist, and while 78.2% of participants reported receiving education about these communication clusters in their undergraduate program, the score on the RHS knowledge assessment indicated that there is still a need for education on this topic. Again this high regard for education could serve as a motivating factor for participating in the education on RHS associated communication impairments.

Better communication with survivors of RHS. The next theme focused on the importance of communication in patient care. Nurses reported that education on RHS associated communication clusters would improve their communication assessment and aid in understanding as well as teaching these patients. The over personalized and disorganized discourse frequently exhibited by survivors of RHS creates an inefficient communication experience with these patients. Persons sustaining a RHS often present with a decreased ability to suppress unrelated and inappropriate meanings with discourse tasks (Brady et al., 2005; C. A. Tompkins et al., 2000). This over personalization and decreased focus can significantly impact communication in general and pose challenges for patient education as the patients get off subject.

Limitations

There are several limitations to this study. One of the greatest limitations involved the data set received from theNCBoN. The practice areas listed in the dataset received from the North Carolina Board of Nursing were self-reported by RNs at the time of license renewal and may not be current at the time of data collection. These work settings were not necessarily reflective of the RNs current work setting which resulted in multiple invitations to nurses who did not meet the study's inclusion criteria.

There was an issue with the Qualtrics software that caused a large number of participants to go directly to the knowledge questions without being asked any demographic questions. This caused a large amount of missing demographic data and prevented any correlation between demographic data and knowledge or with barriers and facilitators. Lastly, the researcher-developed tool presented limitations. The initial attempts to establish validity and reliability of the 12 knowledge items demonstrated a satisfactory but weak reliability. Additional studies with this instrument is needed to establish the usefulness of this tool.

Implications for Nursing Practice

This study identifies a need for specialized continuing education programs offered to nurses. There is an increased prevalence of stroke in the U. S. with nearly one-half of all strokes involving the brain's right hemisphere. Along with this increased prevalence, there has been an increase in stroke survival in the U. S (Go et al., 2014; Mauk et al., 2011; Mozaffarian et al., 2015). This increased survival suggests that this patient population will very likely increase in the future and warrants the need to provide

education on this patient population. Nurses will very likely be caring for larger numbers of patients sustaining RHS, and a strong knowledge base of the communication clusters commonly exhibited by these patients is essential to providing safe, effective nursing care.

Knowledge of how these impairments may present in patients can aid nurses to customize their assessments to correctly identify the communication behaviors frequently seen with these impairments. Accurate assessment data will lead to correctly identifying these patients' needs leading nurses to plan care that ensures these survivors of RHS receive the nursing care that they need. Individualized planning that incorporates intervention strategies from the speech language pathology literature would promote stronger communication with RHS survivors. On the in-patient nursing unit, nurses are with patients 24 hours each day and are in a position to collaborate with other members of the healthcare team to coordinate effective care for these patients. In the home health arena, nurses serve as the eyes and ears of the healthcare team. Both in-patient nurses and home care nurses could benefit from education on these communication clusters.

The communication behaviors commonly presented following RHS can interfere with conversations. This can negatively impact relationships for the survivor of RHS. One aspect of nursing care that can be negatively impacted by this deficit would be patient education. Involving family and caregiver, communication partner training, in this patient education could positively impact patient safety. Developing patient education materials that include a description of these impairments along with patient post stroke needs would enhance the patient's understanding of care needs and

developing strategies to successfully teach these patients and their families is essential to successful rehabilitation. Providing teaching in a manner that can be both accepted and understood can help these patients respond appropriately to the challenges of living with the subtle impairments commonly seen in RHS patients. The nurse needs to have the knowledge, skills, and abilities to develop teaching and to pull the easily distracted patient back to the teaching focus to best promote the patient correctly following any instruction.

Lastly, with the subtle communication behaviors associated with RHS presenting over time, there is a need for developing a plan for to contact family or caregivers at regular intervals. This follow-up contact would better allow for nurses to assess and evaluate how the patient, family, and caregivers are managing during the post stroke recovery period.

Implications for Nursing Education

The implications for nursing education is multi-faceted. First, there exists a need for continuing education of currently practicing nurses. Nurses value education about issues that impact their patient care. Nurses participating in this study identified benefits of continuing education on this topic and the impact on their patient care. Continuing education should focus on both recognition of these communication clusters, common communication behaviors exhibited following RHS, and progress to specific assessment methods with RHS focused interventions. These topics would be valuable continuing education topics for nurses. Secondly, beginning nurses would also benefit from basic nursing curricula that includes the above information about RHS communication clusters.

Both approaches would strengthen the nursing workforce in caring for this patient population. Following this focused education, a third focus would be to include questions assessing knowledge of the communication clusters associated with RHS to the national certification exams for rehabilitation nursing (CRRN), neuroscience nursing (CNRN, and stroke nursing (SCRN). Review of the blueprints for these certification exams revealed that these topics were not included in the content areas. Review courses and review materials for these exams could also be expanded to include these care topics.

Implications for Nursing Policy

This study presents possibilities for changes on nursing policy. Nursing knowledge of RHS associated communication clusters influences nursing care. Providing appropriate nursing care for these patients may impact patient safety. Patients sustaining stroke often exhibit gait impairments that may increase their risk for falls. Communicating effectively with these patients requires verifying their understanding of the communication. If the patient does not understand the safety teaching, this can negatively affect their fall risk.

Promoting a safe patient environment also has an impact on patient satisfaction. Patients and families who perceive that they are in an unsafe situation may very likely be dissatisfied with their care. Similarly, difficulty with communication is often a dissatisfier for patient care. Both poor communication and an unsafe environment may negatively affect healthcare organization's patient satisfaction scores.

A third impact for health policy lies with the employer or healthcare organization. Participants identified work responsibilities as a weak barrier to participating in

continuing education on RHS associated communication clusters. There is a need for employers to either provide this education on site or to require this education for nurses.

Implications for Future Research

With the RHS Knowledge Assessment tool being a newly developed survey for this research study, there is a need for additional research to further establish reliability and validity of this instrument. The decrease in the KR20 score from the pilot study to the full study suggests a need for further tool development and study. Replication of this study with a different nursing population would aid in establishing both reliability and validity. There is much research that could be performed with regards to the tool including, assessing the reliability of the four knowledge topic subscales. This research instrument could be enhanced by determining inter-item reliability of the knowledge items. Assessing the 12 knowledge items for Bloom's taxonomy would also enhance this tool's strength as a research instrument.

A second research opportunity would be to expand this study to develop evidence-based nursing care addressing the communication impairments commonly resulting from RHS. With the paucity of nursing research returned on this topic during literature searches, there is a strong need for additional research on nursing care and RHS associated communication impairments.

This study is encouraging in that it reveals that nurses are interested in learning more about communication clusters associated with RHS. Nurses in this sample demonstrated a strong interest in additional education and in applying this education to care of patients. Following the development of evidence-based nursing care, there is

benefit to conducting a research study, using a pretest and posttest design to evaluate the knowledge nurses gain from participating in an education intervention about RHS associated communication impairments.

There would be benefit to conducting a similar study surveying both critical care and emergency room nurses. Lastly, research correlating employment setting to knowledge of RHS communication impairment would be beneficial in identifying patient care areas where nurses need more knowledge. This last study would aid in determining how to best design nursing education programs and tailor these programs to meet the audiences' learning needs.

Conclusions

Nurses in N. C. presented a knowledge gap in the communication impairments commonly manifestoed following RHS. The most exciting finding of this study was the high regard that RN participants placed on education that can improve patient care for this group. The most reported barriers to RNs participating in continuing education were: work responsibilities, family responsibilities, and cost of continuing education programs. Similarly, the most commonly reported facilitators to participating in continuing education included, improving nursing care, increasing competency with RHS survivors, as well as improving critical thinking and decision making.

The findings suggest that RHS Communication Knowledge Assessment tool is a valid assessment of RN knowledge of RHS communication clusters; however, additional research with this instrument is needed to further establish validity and reliability. This study and the survey tool served as a stimulus for nurses to learn more about this topic.

Lastly, the Theory of Planned Behavior was a useful guide to this study. This theory was instrumental in recognizing the relationship between motivation, interest, and intention and their impact on behavioral changes.

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APPENDIX A

RN RECRUITMENT E-MAIL

Subject: Study about Communication Impairment Associated with Strokes affecting the Brain's Right Hemisphere

Greetings Fellow RN,

My name is Susan Brooks. I am an RN and a graduate student at the University of North Carolina at Greensboro. Communication impairments seen in people who sustain strokes affecting the brain's right hemisphere are a serious problem, but very little is known about these communication impairments. I want to invite you to complete a short survey about your knowledge about communication impairments associated with strokes affecting the brain's right hemisphere and your interest in learning more about these impairments. The information gathered from your survey will be combined with survey data from other nurses to help us identify more effective ways to prepare nurses to provide safe care.

To complete the survey just click on the link below. It should only take you about 20 minutes to complete the survey, and you will have the opportunity to be entered into a drawing for one of eight $25 Amazon gift cards. There are no correct or incorrect responses, only your much-needed thoughts about strokes affecting the brain's right hemisphere. All responses are confidential and there is no way they can be traced to an individual or organization once you have finished the survey. I would appreciate it if you can complete the survey by May 15, 2017.

Thanks very much for taking the time to complete my survey! If you would like to contact me before completing the survey, feel free to email me at or call me at 704-699-9085.

Sincerely,

Susan Brooks

Susan Brooks, PhD(c), RN

UNC Greensboro PhD Student

APPENDIX B

IRB INFORMATION SHEET

Project Title: Exploration of Knowledge of N. C. RNs of Communication Impairments Associated with Right Hemisphere Stroke
Principal Investigator: Susan K. Brooks, PhD(c), RN
Faculty Advisor: Eileen Kohlenberg, PhD,RN

What is this all about?

I am asking you to participate in this research study because I want to explore the degree of knowledge that NC registered nurses have about strokes affecting the brain's right hemisphere and associated communication impairments. The study will also examine barriers and enablers to RNs learning about these communication impairments. Additionally, the researcher will explore how nurses report they anticipate changing their care of right hemisphere stroke survivors based on their knowledge self-assessment of this condition. This research project will only take one 20 minute session and will involve you completing an online survey. Your participation in this research project is Voluntary.

How will this negatively affect me?

Other than the time you spend on this project there are no known or foreseeable risks involved with this study.

What do I get out of this research project?

The findings from this study may help improve nurses' knowledge of communication impairments associated with right hemisphere stroke and/or the care that nurses provide to these patients.

Will I get paid for participating?

You will not be paid for participating but will have the opportunity to be entered in a drawing for one of eight $25.00 Amazon gift cards.

What about my confidentiality?

We will do everything possible to make sure that your information is kept confidential. We will not ask for your name or any personal information, and the IP address of your computer will not be recorded with your survey responses. All survey data will be kept in password protected computers. If you choose to be entered in the random drawing for a gift card, you will be transferred to a separate survey to provide your e-mail address. The separate survey cannot be connected to your survey responses. Absolute confidentiality of data provided through the internet cannot be guaranteed due to the limited protections of internet access. Please close your browser when finished so no one will be able to see what you have been doing.

What if I do not want to be in this research study?

You do not have to be part of this project. This project is voluntary and it is up to you to decide to participate in this research project. If you agree to participate at any time in this project you may stop participating without penalty.

What if I have questions?

You can ask Susan Brooks, the Principal Investigator (skbrooks@uncg.edu) or Dr. Eileen Kohlenberg, Faculty Advisor (egkohlen@uncg.edu) anything about the study. If you have concerns about how you have been treated in this study, call the Office of Research Integrity Director at 1-855-251-2351.

APPENDIX C

RHS COMMUNICATION IMPAIRMENT KNOWLEDGE ASSESSMENT

Q1.1

- ❍ I have read the information above and agree to participate in this study. (1)
- ❍ I do not want to participate in this study. (2)

Q55 Because your time is valuable, we would like to start off by asking you a few questions to be sure that you meet the criteria to participate in this study.

NCRN Do you work as an RN in North Carolina?

- ❍ Yes (23)
- ❍ No (24)

WRKSTG What is your area of nursing practice

❍ Medical-surgical nursing (1)	❍ Assisted living facility (6)
❍ Critical care nursing (2)	❍ Pediatrics (7)
❍ Home health nursing (3)	❍ Maternal-child (8)
❍ In-patient rehabilitation (4)	❍ Mental Health (9)
❍ Skilled nursing facility (5)	

Q1.2 This section asks basic questions about you.

AGE

❍ Under 25 (1)	❍ 55 - 64 (5)
❍ 25 - 34 (2)	❍ 65 - 74 (6)
❍ 35 - 44 (3)	❍ 75 or older (7)
❍ 45 - 54 (4)	

GNDR Gender

- ❍ Male (1)
- ❍ Female (2)

HED Highest level of nursing education

❍ Associate degree (1)	❍ Masters degree (3)
❍ Bachelor's degree (2)	❍ Doctorate (4)

RNYRS How long have you been a registered nurse?

❍ Less than 5 years (1)	❍ 25 - 29 years (6)
❍ 5 - 9 years (2)	❍ 30 - 34 years (7)
❍ 10 - 14 years (3)	❍ 35 - 39 years (8)
❍ 15 - 19 years (4)	❍ 40 - 44 years (9)
❍ 20 - 24 years (5)	❍ Greater than 45 years (10)

STRKE12M In the last 12 months have you taken care of a patient who has experienced a stroke?

❍ Yes (1)
❍ No (2)

STRKEYRS How long have you taken care of patients who have experienced stroke?

❍ Less than 5 years (1)	❍ 25 - 29 years (6)
❍ 5 - 9 years (2)	❍ 30 - 34 years (7)
❍ 10 - 14 years (3)	❍ 35 - 39 years (8)
❍ 15 - 19 years (4)	❍ 40 - 44 years (9)
❍ 20 - 24 years (5)	❍ Greater than 45 years (10)

STRKE% What percentage of your patients have experienced a stroke?

❍ Less than 10% (1)	❍ 51 - 75% (4)
❍ 10 - 25% (2)	❍ 76 - 90% (5)
❍ 26 - 50% (3)	❍ Greater than 90% (6)

UEDRHCI During your undergraduate nursing education did you receive education about communication impairments associated with right hemisphere stroke (left hemiparesis)?

❍ Yes (1)
❍ No (2)

ADEDRHCI Since completing your undergraduate nursing education, have you received any training or continuing education about right hemisphere stroke associated communication impairments?

- ❍ Yes (1)
- ❍ No (2)

EDLOC If yes, please indicate where you received this education

- ❍ Continuing education content (1)
- ❍ Website (2)
- ❍ Healthcare provider (3)
- ❍ Guest speaker (4)

Q48 This next section will assess your knowledge of communication behaviors associated with right hemisphere stroke (left hemiparesis).

TD1 What term do we use to describe the impairment that is demonstrated when a patient gets easily distracted or moves off subject during a conversation?

- ❍ Anosognosia (1)
- ❍ Tangential discourse (2)
- ❍ Affective prosody (3)
- ❍ Neglect (4)

ANGA1 What term do we use to describe the impairment that is demonstrated when a patient denies that he/she has any deficits related to the stroke?

- ❍ Anosognosia (1)
- ❍ Tangential discourse (2)
- ❍ Affective prosody (3)
- ❍ Neglect (4)

AP1 What term do we use to describe the impairment demonstrated in the use of facial expressions?

- ❍ Anosognosia (1)
- ❍ Tangential discourse (2)
- ❍ Affective prosody (3)
- ❍ Neglect (4)

NGT1 What term do we use to describe the impairment demonstrated when a patient gazes only to the right during a conversation?

- Anosognosia (1)
- Tangential discourse (2)
- Affective prosody (3)
- Neglect (4)

TD2 The nurse is talking with a patient who has been diagnosed with a right hemisphere stroke. Which communication behavior is associated with right hemisphere stroke?

- Aphasia (1)
- Difficulty retrieving words (2)
- Difficulty following conversational cues (3)
- There are no specific communication behaviors associated with right hemisphere stroke. (4)

TD3 The nurse is caring for a patient who survived a right hemisphere stroke 1 month ago. In teaching this patient about post stroke care, there may be challenges specific to right hemisphere stroke. What challenges may the nurse observe?

- Looks only to the left side during interaction. (1)
- Difficulty understanding printed materials (2)
- Easily gets off topic of conversation during teaching. (3)
- Frequently repeats back the nurse's comments during teaching. (4)

AP2 The nurse is preparing to discharge a patient who has sustained a right hemisphere stroke. What type of emotional affect is common for survivors of right hemisphere stroke?

- Subdued (1)
- Animated (2)
- Belligerent (3)
- Passionate (4)

ANGA2 Survivors of right hemisphere stroke often present with anosognosia. How does this syndrome present?

- Denial of any disability (1)
- Inability to speak (2)
- Inability to understand spoken words (3)
- Inability to name common objects (4)

NGT2 The client who has had a stroke combs only the right side of her head and washes only the right side of her face. What is the nurse's interpretation of these actions?

- ❍ The client has poor left side motor control. (1)
- ❍ The client is unaware of the existence of the right side. (2)
- ❍ The client's visual perception of the left side is limited. (3)
- ❍ The client has paralysis or contractures of the left side. (4)

ANGA3 As part of planning long-term care for a client exhibiting anosognosia, what would the nurse include?

- ❍ Help the client accept the decrease in their physical abilities. (1)
- ❍ Begin helping the client associate words with physical objects. (2)
- ❍ Wait for the client to verbalize needs regardless of how long it may take. (3)
- ❍ Help family members accept the fact that they will need to assist more with physical care. (4)

TD4 The nurse is caring for a client who experienced a right hemisphere stroke 6 weeks ago. Given the right hemisphere's role in communication, what would be an appropriate goal for this patient?

- ❍ The client will speak independently and clearly. (1)
- ❍ The client will not understand verbal communication. (2)
- ❍ The client will demonstrate staying on subject while speaking. (3)
- ❍ The client will speak without word retrieval assistance from RNs or caregivers. (4)

NGT3 A patient who survived a right hemisphere stroke demonstrates a strong gaze preference to the right. Which intervention would promote this patient's long term safety?

- ❍ Rounding every two hours. (1)
- ❍ Placing call light on his left side. (2)
- ❍ Performing passive range of motion of neck. (3)
- ❍ Clearing clutter from floor on the patient's left side only. (4)

Q4.13 Prior to answering the next section, please check the correct answers on the above knowledge questions and use your responses as a self-assessment of your knowledge. Use this self-assessment to complete the following section.

TD1. What term do we use to describe the impairment that is demonstrated when a patient get easily distracted or moves off subject during a conversation?

- Anosognosia (1)
- Tangential discourse (2)
- Affective prosody (3)
- Neglect(4)

Answer: Tangential discourse. Survivors of strokes affecting the brain's right hemisphere often easily get off topic

ANGA1. What term do we use to describe the impairment that is demonstrated when a patient denies that he/she has any deficits related to the stroke?

- Anosognosia (1)
- Tangential discourse (2)
- Affective prosody (3)
- Neglect(4)

Answer: Anosognosia is the term used to describe the pathological denial of disability commonly seen in survivors of strokes affecting the brain's right hemisphere.

AP1. What term do we use to describe the impairment demonstrated in the use of facial expressions?

- Anosognosia (1)
- Tangential discourse (2)
- Affective prosody (3)
- Neglect(4)

Answer: Affective prosody is commonly seen in survivors of strokes affecting the brain's right hemisphere and affects the ability to both convey and understand emotional cues in conversations.

NGT1. What term do we use to describe the impairment demonstrated when a patient gazes only to the right during a conversation?

- Anosognosia (1)
- Tangential discourse (2)
- Affective prosody (3)
- Neglect(4)

Answer: Neglect is a common phenomenon associated with strokes affecting the brain's right hemisphere and presents with a right preference gaze as well as ignoring items located on the patient's left side.

TD2. The nurse is talking with a patient who has been diagnosed with a right hemisphere stroke. Which communication behavior is associated with right hemisphere stroke?

- ❍ Aphasia (1)
- ❍ Difficulty retrieving words (2)
- ❍ Difficulty following conversational cues (3)
- ❍ There are no specific communication behaviors associated with right hemisphere stroke (4)

Answer: Tangential discourse. Survivors of strokes affecting the brain's right hemisphere often easily get off topic and may have difficulty following conversational cues.

TD3. The nurse is caring for a patient who survived a right hemisphere stroke a month ago. In teaching this patient about post stroke care, there may be challenges specific to right hemisphere stroke. What challenges may the nurse observe?

- ❍ Looks only to the left side during interaction (1)
- ❍ Difficulty understanding printed materials (2)
- ❍ Easily gets off topic of conversation during teaching. (3)
- ❍ Frequently repeats back the nurse's comments during teaching. (4)

Answer: Tangential discourse. Survivors of strokes affecting the brain's right hemisphere often easily get off topic and may have difficulty following conversational cues

AP2. The nurse is preparing to discharge a patient who has sustained a right hemisphere stroke. What type of emotional affect is common for survivors of right hemisphere stroke?

- ❍ Subdued
- ❍ Animated
- ❍ Belligerent
- ❍ Passionate

Answer: Subdued affect is commonly seen in survivors of strokes affecting the brain's right hemisphere because of the right hemisphere's role in understanding and demonstrating emotional cues in conversations

ANGA2. Survivors of right hemisphere stroke often present with anosognosia. How does this syndrome present?

- ❍ Denial of any disability. (1)
- ❍ Inability to speak. (2)
- ❍ Inability to understand spoken words. (3)
- ❍ Inability to name common objects. (4)

Answer: Anosognosia is the term used to describe the pathological denial of disability commonly seen in survivors of strokes affecting the brain's right hemisphere.

ANGA3 As part of planning long-term care for a client exhibiting anosognosia, what would the nurse include?

- ❍ Help the client accept the decrease in their physical abilities. (1)
- ❍ Begin helping the client associate words with physical objects. (2)
- ❍ Wait for the client to verbalize needs regardless of how long it may take. (3)
- ❍ Help family members accept the fact that they will need to assist more with physical care. (4)

Answer: Help the client accept the decrease in their physical abilities. These patients need to accept the disability in order to work on their rehabilitation. Denial of disability (anosognosia) is a common finding in survivors of strokes affecting the brain's right hemisphere. They are often unaware that any disability exists.

TD4 The nurse is caring for a client who experienced a right hemisphere stroke 6 weeks ago. Given the right hemisphere's role in communication, what would be an appropriate goal for this patient?

- ❍ The client will speak independently and clearly. (1)
- ❍ The client will not understand verbal communication. (2)
- ❍ The client will demonstrate staying on subject while speaking. (3)
- ❍ The client will speak without word retrieval assistance from RNs or caregivers. (4)

Answer: The patient will demonstrate staying on subject while speaking. The brain's right hemisphere often easily get off topic and may have difficulty following conversational cues.

NGT3 A patient who survived a right hemisphere stroke demonstrates a strong gaze preference to the right. Which intervention would promote this patient's long term safety?

- ❍ Rounding every two hours. (1)
- ❍ Placing call light on his left side. (2)
- ❍ Performing passive range of motion of neck. (3)
- ❍ Clearing clutter from floor on the patient's left side only. (4)

Answer: Performing passive range of motion of the neck. Survivors of strokes affecting the brain's right hemisphere demonstrate left side neglect. Range of motion on the neck will help to prevent neck contractures associated with right gaze preference.

Q5.2 Based on your knowledge self- assessment, please rate the importance of the following on your participation in continuing education about right hemisphere stroke associated communication impairments from strongly disagree to strongly agree.

	Strongly disagree (1)	Disagree (2)	Neither agree or disagree (3)	Agree (4)	Strongly agree (5)
I think that I need education on the symptom of right hemisphere (RH) stroke (1)	❍	❍	❍	❍	❍
I think that updating my knowledge on RH stroke survivors' communication challenges will change my nursing care. (2)	❍	❍	❍	❍	❍
I am interested in receiving education on communication challenges seen in survivors of strokes affecting the brain's right	❍	❍	❍	❍	❍

	Strongly disagree (1)	Disagree (2)	Neither agree or disagree (3)	Agree (4)	Strongly agree (5)
hemisphere. (3)					
My family responsibilities interfere with my time to participate in continuing education about RH stroke communication challenges. (4)	❍	❍	❍	❍	❍
My work responsibilities interfere with my time to participate in continuing education about RH stroke communication challenges. (5)	❍	❍	❍	❍	❍
My employer will provide time off to participate in education about RH stroke communication challenges (6)	❍	❍	❍	❍	❍
My family will support my participation in continuing education about RH stroke communication challenges. (7)	❍	❍	❍	❍	❍
I will	❍	❍	❍	❍	❍

	Strongly disagree (1)	Disagree (2)	Neither agree or disagree (3)	Agree (4)	Strongly agree (5)
collaborate with speech language pathologists (SLP) in planning and providing care to patients sustaining RH stroke. (8)					
I think that updating my knowledge will help me to provide better care to survivors of right hemisphere stroke. (9)	❍	❍	❍	❍	❍
Updating my knowledge will improve my decision making in the care of patients with communication impairments resulting from strokes affecting the brain's right hemisphere. (10)	❍	❍	❍	❍	❍
I would not want to participate in any education on this topic because of my previous	❍	❍	❍	❍	❍

	Strongly disagree (1)	Disagree (2)	Neither agree or disagree (3)	Agree (4)	Strongly agree (5)
experiences with continuing education. (11)					
I would not want to participate in any education on this topic because of my physical health. (12)	❍	❍	❍	❍	❍
I would want to participate in education on this topic to increase my competency with survivors of right hemisphere strokes. (13)	❍	❍	❍	❍	❍
I would not want to participate in any education on this topic because of time limitations. (14)	❍	❍	❍	❍	❍
I would not want to participate in any education on this topic because my job satisfies this with on the job training. (15)	❍	❍	❍	❍	❍
I would not	❍	❍	❍	❍	❍

	Strongly disagree (1)	Disagree (2)	Neither agree or disagree (3)	Agree (4)	Strongly agree (5)
want to participate in any education on this topic because of travel distance to programs. (16)					
I would not want to participate in any education on this topic because my peers do not attend continuing education. (17)	❍	❍	❍	❍	❍
I would not want to participate in any education on this topic because of the cost of courses. (18)	❍	❍	❍	❍	❍

EDONCRE Based on your self-assessment of your knowledge of right hemisphere stroke associated communication impairments, would your nursing care for these patients remain the same as prior to the education or would your care change?

❍ My care would change (1)

❍ My care would stay the same (2)

QUAL If you answered "my care would change", how would you anticipate this information changing your nursing practice?

Q6.1 Would you like to be entered in a random drawing for one of 8 Amazon gift cards or receive a summary of the findings?

- ❍ Yes (1)
- ❍ No (2)